DOCUMENT RESUME

ED 344 002 CE 060 710

TITLE	Quality Assurance Program Development--Curriculum Development.
INSTITUTION	Wisconsin Indianhead Technical Coll., Shell Lake.
SPONS AGENCY	Wisconsin State Board of Vocational, Technical, and Adult Education, Madison.
PUB DATE	91
NOTE	272p.; Newspaper articles may not reproduce well.
PUB TYPE	Guides - Classroom Use - Teaching Guides (For Teacher) (052)
EDRS PRICE	MF01/PC11 Plus Postage.
DESCRIPTORS	Behavioral Objectives; Blueprints; Competence; *Course Content; *Course Descriptions; Course Objectives; Lesson Plans; Manufacturing; Postsecondary Education; *Quality Control; *Standards; *Statistics; Teaching Methods; Teamwork; Two Year Colleges; Vocational Education

ABSTRACT

This document has two parts: (1) course outlines and unit lesson plans for 10 vocational courses; and (2) course descriptions. competencies, and topical outlines for 7 courses in a quality assurance curriculum. In the first part, outlines and unit lesson plans are provided for the following courses: standards and specifications, materials, basic statistics, print reading, introduction to quality assurance, production processes, product and system quality control, statistical process control, industrial and technical internship, and statistical analysis. The materials include instructional competencies, references, instructor equipment and audiovisual needs, student materials, and evaluation measures, an instructor presentation outline, and other information. Part 2 provides descriptions, competencies, and topical outlines for the following courses: industrial economics and finance, quality concepts and team building, design of experiments, geometrical dimensioning and tolerancing, technical computing and presentation, technical reporting, and principles of supervision. References are suggested for each course. (KC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED344002

QUALITY ASSURANCE PROGRAM DEVELOPMENT

CURRICULUM DEVELOPMENT

Wisconsin Indianhead Technical College
Shell Lake, WI

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Lifermatuct

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

CE 060710

BEST COPY AVAILABLE

W191CD04

#17-302-150-241 Quality Assurance Program Development - Curriculum Development

The attached curriculum materials are arranged in two sections:

I. Course Outlines and Unit Lesson Plans for:

A.	Standards and Specifications	2 Credits
B.	Materials	2 Credits
C.	Basic Statistics	2 Credits
D.	Print Reading	2 Credits
E.	Introduction to Quality Assurance	3 Credits
F.	Production Processes	3 Credits
G.	Product and System Quality Control	3 Credits
H.	Statistical Process Control	3 Credits
I.	Internship - Industrial-Technical	3 Credits
J.	Statistical Analysis	3 Credits
	Total Credits	26 Credits

II. Course Descriptions, Competencies, and Topical Outlines for:

A.	Industrial Economics and Finance	3 Credits
B.	Quality Concepts and Team Building	3 Credits
C.	Design of Experiments	2 Credits
D.	Geometrical Dimensioning and Tolerancing	2 Credits
E.	Technical Computing and Presentation	2 Credits
F.	Technical Reporting	3 Credits
G.	Principles of Supervision	3 Credits
	Total Credits	18 Credits

C6231XBCO/PNDFTCOURS/S30QTXT

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline

12/04/89

COURSE TITLE	Standards and Specifications		
COURSE NUMBER	10-623-1XB	CLASSROOM PRESENTATIONS	(A) 36.00
SEMESTER HOURS	36.00	LAB/CLINICAL/SHOP EXPERIENCE	(B)
CREDITS	2.00	INDIVIDUAL/INDEPENDENT INSTRUCTION	(C)
CEU'S		SIMULATED/ACTUAL OCCUPATIONAL EXP	(D)
CEC'S		ON-THE-JOB EXPERIENCE	(E)

COURSE DESCRIPTION:

The purpose of this course is to introduce the student to standards and specifications, and to provide information which will assist in understanding such documents and how they relate to the duties of a quality assurance technician. It is a study of the historical origins, need for existence, content, application, and governing organizations for standards and specifications.

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. Discuss the differences between voluntary standards and mandatory standards.
2. Explain how a committee functions in the creation and revision of a standard.
3. Describe how to locate a standard organization and obtain a copy of their specification.
4. Explain the functions of the Standards Engineering Society.
5. List the duties of the standards technician, the standards writer, and the standards engineer.
6. Discuss the organization and objectives of the National Conference of Standards Laboratories.
7. Discuss the effects of the Occupational Safety and Health Act and the Environmental Protection Act have upon the manufacture of a product.
8. Understand the application of military standards in fulfilling a government contract.

PREPARED BY: Bruce A. Nelson
SUBMITTED BY:
COORD. APPROVAL:
DATE:
REVISED:
DISTRICT APPROVAL:
DATE:

COURSE TITLE: Standards and Specifications
COURSE NUMBER: 10-623-1XB

COURSE OUTLINE BY UNITS:

		TYPE OF HOURS A	B
I.	Definition of a Standard	5.00	
	A. Scope		
	B. History		
	C. Types of Standards		
II.	Uses of Standards	6.00	
	A. Subcategories (National, International, Proprietary, Industrial and Personal Standards)		
	B. Application of Voluntary Standards		
	C. Application of Mandatory Standards		
	D. Standards for Commercial Products		
III.	Standards Preparation	5.00	
	A. Standards Committees		
	B. Standards Approval		
	C. Standards Revision		
IV.	Standards Organization	5.00	
	A. Societies, Institutes, and Associations		
	B. Government Controlled Standards Organizations		
V.	The Standards Engineering Society	5.00	
	A. Purpose and Benefits		
	B. Activities, Publications and Membership		
VI.	Other Standards	5.00	
	A. Standards in English Speaking Countries		
	B. Canadian Standards		
VII.	Miscellaneous	5.00	
	A. Standards Related Job Descriptions		
	B. National Conference of Standards Laboratories		
	C. Factory Mutual System		
	Totals	36.00	0

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

STANDARDS AND STANDARDIZATION, Marcel Dekker, Inc. (distributed by American Society for Quality Control)
Copies of Standards from various organizations.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XB HRS/INSTRUCTION: LECTURE 5 LAB ____

COURSE TITLE: Standards and Specifications DATE PREPARED: 8/10/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit I: Definition of a Standard DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Develop a definition of a standard describing the difference between active and reactive types.
2. Explain the scope of a written standard and what they are meant to control.
3. Describe the historical need for standards and some early standards that were developed.
4. List different types of standards and define the difference between voluntary and mandatory standards.

REFERENCES:

Handout showing various typical standards used everyday.

INSTRUCTOR EQUIPMENT/AV NEEDS:

Overhead projector

STUDENT MATERIALS:

Standards and Standardization, Charles Sullivan, Marcel Dekker, New York.

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
AV-CHALKBOARD DIAGRAM

I. Definition of a Standard

A. Scope

B. History

C. Types of Standards

OTHER INFORMATION (Grading practices, safety, other)

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XB HRS/INSTRUCTION: LECTURE 6 LAB ____

COURSE TITLE: Standards and Specifications DATE PREPARED: 8/10/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit II: Uses of Standards DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Explain the differing types of standard categories including international, national, government, industry, and personal.
2. Describe why voluntary standards are superior in their application and why mandatory standards are sometimes applied.
3. List some standards organizations in each category of international, national, governmental, and industrial.

REFERENCES:

Handouts listing organizations and standards that apply.

INSTRUCTOR EQUIPMENT/AV NEEDS:

Overhead projector, videotapes on standards organizations

STUDENT MATERIALS:

Text

LIST OF EVALUATION MEASURES:

Answers questions on standards organizations
Quiz

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
AV-CHALKBOARD DIAGRAM

II. Uses of Standards

A. Subcategories

B. Application of Voluntary Standards

C. Application of Mandatory Standards

D. Standards for Commercial Products

O.H. of Standards
Pertaining to:
National, International,
Proprietary, and Industrial

OTHER INFORMATION (Grading practices, safety, other)

Report of commercial product standards

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XB HRS/INSTRUCTION: LECTURE 5 LAB ____

COURSE TITLE: Standards and Specifications DATE PREPARED: 8/11/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit III: Standards Preparation DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Explain how standards committees are formed and who serves on them.
2. Describe the inner workings on a standards committee and how a national or international standard becomes approved.
3. Explain how committees update and revise an existing standard and why the revisions may be necessary.

REFERENCES:

Handout - How committees are formed and operate.

INSTRUCTOR EQUIPMENT/AV NEEDS:

Overhead projector
video - committees for standards

STUDENT MATERIALS:

Text

LIST OF EVALUATION MEASURES:

Form class committee for grading a product for standards - ex.: eggs

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
AV-CHALKBOARD DIAGRAM

III. Standards Preparation

A. Standards Committees

B. Standards Approval

OTHER INFORMATION (Grading practices, safety, other)

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
AV-CHALKBOARD DIAGRAM

IV. Standards Organizations

A. Societies, institutes and associations

B. Government controlled standards organizations.

OTHER INFORMATION (Grading practices, safety, other)

Write a specification based on an ASTM or ASME standard.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XB HRS/INSTRUCTION: LECTURE 5 LAB ____

COURSE TITLE: Standards and Specifications DATE PREPARED: 8/11/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

IV: Standards Organizations DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. List national standards societies and associations in U.S. and describe what their purpose is.
2. List international standards societies and their purpose.
3. Describe the scope of such societies as ASTM, ANSI, SAE, ISO, ASME, UL, and ASQC.
4. Define a government regulatory controlled organization and explain their purpose.
5. Explain the function of such government organizations as: NBS, DOD, GATT, and OSHA.

REFERENCES:

1. Handout of Standards Societies
2. ASQC Magazine

INSTRUCTOR EQUIPMENT/AV NEEDS:

Overhead projector

STUDENT MATERIALS:

Text

LIST OF EVALUATION MEASURES:

Read ASQC materials and report on a section of interest.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XB HRS/INSTRUCTION: LECTURE 5 LAB ____

COURSE TITLE: Standards and Specifications DATE PREPARED: 8/17/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit V: The Standards Engineering Society DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Define the purpose and scope of the Standards Engineering Society.
2. List activities of the S.E.S. such as publications, reports, membership, and public relations.

REFERENCES:

S.E.S. Magazine

INSTRUCTOR EQUIPMENT/AV NEEDS:

Overhead projector

STUDENT MATERIALS:

Text

LIST OF EVALUATION MEASURES:

Report on how to become a member of the Standards Engineering Society.

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
AV-CHALKBOARD DIAGRAM

V. The Standards Engineering Society

A. Purpose and Benefits

B. Activities, publications, and membership.

OTHER INFORMATION (Grading practices, safety, other)

Write to S.E.S. for information.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XB HRS/INSTRUCTION: LECTURE 5 LAB ____

COURSE TITLE: Standards and Specifications DATE PREPARED: 8/17/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit VI: Other Standards DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Describe the history of the ABCA (American, British, Canadian, Australian) unification of Engineering Standards Organization.
2. Detail reasons for the ABCA's formulation and why it continues to be important.
3. Describe the development and scope of the CSA (Canadian Standards Association) and how it co-ordinates with the U.S. standards societies.

REFERENCES:

1. Handout of ABCA information
2. Handout of CSA information

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

Text

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
AV-CHALKBOARD DIAGRAM

VI. Other Standards

A. Standards in English Speaking Countries

B. Canadian Standards

OTHER INFORMATION (Grading practices, safety, other)

Write for publications from ABCA and CSA

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XB HRS/INSTRUCTION: LECTURE 5 LAB ____

COURSE TITLE: Standards and Specifications DATE PREPARED: 8/18/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit VII: Miscellaneous DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. List activities of the Standards Technician, Standards Writer, and a Standards Engineer
2. Explain the goals and duties of the laboratories societies are and how to benefit the consumer.
3. Describe the history and scope of the factory mutual system and how it protects the worker.

REFERENCES:

1. Handout of Underwriters Laboratories information
2. Handout of Factory Mutual information

INSTRUCTOR EQUIPMENT/AV NEEDS:

Overhead projector

STUDENT MATERIALS:

Text

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
AV-CHALKBOARD DIAGRAM

VII. Miscellaneous

A. Standards related to job descriptions

B. National Conference of Standards Laboratories

C. Factory Mutual System

OTHER INFORMATION (Grading practices, safety, other)

Write for information on standards laboratories.

C:\231XDCC\FNDFTCOURS\636RTXT

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline 06/30/89

COURSE TITLE	Materials		
COURSE NUMBER	10-623-1XD	CLASSROOM PRESENTATIONS	(A) 18.00
SEMESTER HOURS	54	LAB/CLINICAL/SHOP EXPERIENCE	(B) 36.00
CREDITS	2.00	INDIVIDUAL/INDEPENDENT INSTRUCTION	(C)
CEU'S		SIMULATED/ACTUAL OCCUPATIONAL EXP	(D)
CEC'S		ON-THE-JOB EXPERIENCE	(E)

COURSE DESCRIPTION:
This is a basic course that presents materials used in the manufacturing industries. These materials are: metals, plastics, ceramics, petroleum products, wood and paper products. Their extraction from raw materials, refinement, identification and classification are explained. Applications of the uses of these materials for industrial purposes are discussed.

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. Describe the crystalline structure of metals and how this affects their behavior.
2. Explain the structure of some high polymers for the manufacture of certain plastic materials and elastomers.
3. Give an account of the development and methods used in the iron and steelmaking processes.
4. Describe methods of testing metals to determine their various properties.
5. Make some material selections on the basis of mechanical and physical properties.
6. Describe how steel is hardened and tempered.
7. Explain the properties of thermomelt and thermoplastics that are used to manufacture products.
8. Assess the significance of wood materials as a manufacturing material.
9. Identify metals and alloys by their numerical classification system.

PREPARED BY: SUBMITTED BY:
COORD. APPROVAL: DATE: REVISED:
DISTRICT APPROVAL: DATE:

COURSE TITLE: Materials
COURSE NUMBER: 10-623-1XD

COURSE OUTLINE BY UNITS:	TYPE OF HOURS -A-	-B-
I. The Atomic and Crystalline Structure of Materials	3.00	6.00
A. Atomic structure		
B. Classification of atoms		
C. Crystalline structure		
D. Plastic deformation in metals		
E. Plastics, elastomers, and ceramics		
II. Extraction and Refinement of Common Metals	3.00	6.00
A. Ores and mining		
B. Pig iron and steelmaking		
C. Aluminum extraction		
D. Copper, lead and zinc smelting		
E. Magnesium extraction		
F. Space age metals		
III. Metallurgical Science	3.00	6.00
A. Mechanical and physical properties of metals		
B. Metallurgical microscopy		
C. Nondestructive Testing		
IV. Heat-Treatment of Metals	3.00	6.00
A. The iron-carbon diagram		
B. Hardening plain carbon steel		
C. Tempering plain carbon steel		
D. Heat-treating equipment		
E. Surface hardening processes		
F. Annealing, recrystallization and stress relief		
V. Extraction and Refinement of Common Non-Metallic Materials	3.00	6.00
A. Petrochemicals		
B. Thermosetting plastics		
C. Additives and finishes	3.00	6.00
D. Rubbers, elastomers and adhesives		
E. Petroleum products		
F. Ceramic materials		
G. Wood and paper products		
VI. Selection and Application of Materials	3.00	6.00
A. Classification systems for metals		
B. Structural steels, stainless steels and cast irons		
C. Non-ferrous metals		
D. Materials identification and application		
Totals	21.00	42.00

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

COURSE TITLE: Materials
COURSE NUMBER: 10-623-1XD

MODERN MATERIALS AND MANUFACTURING PROCESSES, Wiley
G E MANUFACTURING MATERIALS AND PROCESSES VIDEOTAPES PROGRAMS,
Genium Publishing Corp.

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT INSTRUCTION FORM

COURSE NUMBER: 10-623-1XD DATE PREPARED: 8/90

COURSE TITLE: Materials DATE REVISED: _____

LESSON/UNIT TITLE AND/OR NUMBER:
I. The Atomic and Crystalline Structure of Materials

UNIT HRS/INST. LECTURE 1 LAB 2

INSTRUCTOR Bruce Nelson

LEARNING OBJECTIVES/COMPETENCIES

Upon successful completion of the lesson/unit, the student should be able to:

1. Explain a simplified model of the atom.
2. Understand several loading arrangements and explain the role of balance in bonding.
3. Describe the crystalline structure of metals and how this affects their behavior.
4. Give an account of the structure of some high polymers for the manufacture of certain plastic materials and elastomers.
5. Describe the crystalline structure of clays and other ceramics and their bonding arrangements.

INSTRUCTOR REFERENCES:

Modern Materials and Manufacturing Processes - by Neely and Kibbe - published by Wiley

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Answer review questions at the end of chapter 1.

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
A.V./CHALKBOARD DIAGRAM

I. Atomic Structure
   A. Atomic bonding
   B. Classification of atoms
   C. Metals and non-metals

II. Crystalline Structures
   A. Interatomic distances
   B. Unit cells
   C. Deudrite formation
   D. Grain boundaries

III. Plastic deformation in metals
   A. Grain size
   B. Hardening metals

IV. Plastics, Elastomers, and Ceramics
   A. Crystalline structure of plastics
   B. Polymers
   C. Ceramics
   D. Glass
   E. Portland cement

OTHER INFORMATION (Grading assignments, safety, other)

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT INSTRUCTION FORM

COURSE NUMBER: 10-623-1XD DATE PREPARED: 8/90

COURSE TITLE: Materials DATE REVISED: _____

LESSON/UNIT TITLE AND/OR NUMBER:
II. Extraction and Refinement of Common Metals

UNIT HRS/INST. LECTURE 1 LAB 2

INSTRUCTOR Bruce Nelson

LEARNING OBJECTIVES/COMPETENCIES

Upon successful completion of the lesson/unit, the student should be able to:

1. Describe methods of mining and processing metallic ores.
2. Give an account of the development and methods used in the iron and steelmaking processes.
3. Explain some of the principles and methods used in smelting several non-ferrous metals.
4. Show the construction and principles of operation for several types of furnaces and refining vessels.

INSTRUCTOR REFERENCES:

Modern Materials and Manufacturing Processes - by Neely and Kibbe - published by Wiley

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Answer review questions at the end of chapter 2.

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
A.V./CHALKBOARD DIAGRAM

I. Ores and mining
   A. Iron ore
   B. Aluminum ore
   C. Ore treatments
   D. Direct reduction of iron
   E. Sponge iron
   F. Wrought iron

II. Pig iron

III. Steelmaking
   A. Furnaces
   B. Advanced melting and refining

IV. Aluminum extraction
   A. Smelting aluminum

V. Copper smelting

VI. Magnesium extraction

VII. Lead and Zinc smelting

VIII. Space age metals
   A. Extraction

OTHER INFORMATION (Grading assignments, safety, other)

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT INSTRUCTION FORM

COURSE NUMBER: 10-623-1XD DATE PREPARED: 8/90

COURSE TITLE: Materials DATE REVISED: _____

LESSON/UNIT TITLE AND/OR NUMBER:
III. Metallurgical Science

UNIT HRS/INST. LECTURE 1 LAB 2

INSTRUCTOR Bruce Nelson

LEARNING OBJECTIVES/COMPETENCIES

Upon successful completion of the lesson/unit, the student should be able to:

1. Understand the behavior of metals in terms of their mechanical properties.
2. Describe the method of testing metals to determine their various properties.
3. Make some material selections on the basis of mechanical and physical properties.
4. Explain how the microstructure of metals can be seen and photographed.
5. Show how mechanical parts, steel structure, and pipeline can be tested for flaws without damaging them for use.

INSTRUCTOR REFERENCES:

Modern Materials and Manufacturing Processes - by Neely and Kibbe - published by Wiley

INSTRUCTOR EQUIPMENT/AV NEEDS:

(See back)

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Answer review questions at the end of chapter 3.

(9/90/ar/E1.39)

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
A.V./CHALKBOARD DIAGRAM

I. Mechanical and physical properties of metals
   A. Mechanical properties
   B. Physical properties of metals

II. Metallurgy microscopy

III. Nondestructive testing

OTHER INFORMATION (Grading assignments, safety, other)

Appropriate videotape:

Manufacturing Materials and Processes videotape
"Introduction to Metallurgy" by Genium Publishing Corporation

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT INSTRUCTION FORM

COURSE NUMBER: 10-623-1XD DATE PREPARED: 8/90

COURSE TITLE: Materials DATE REVISED: _____

LESSON/UNIT TITLE AND/OR NUMBER:
IV. Heat Treatment of Metals

UNIT HRS/INST. LECTURE 1 LAB 2

INSTRUCTOR Bruce Nelson

LEARNING OBJECTIVES/COMPETENCIES

Upon successful completion of the lesson/unit, the student should be able to:

1. Use an iron-carbon diagram to explain the basic principles involved in heat treating steel.
2. Use an I-T diagram and cooling curves to explain the various microstructures found in carbon steel as a result of cooling rates.
3. Describe how steel is hardened and tempered.
4. Explain several methods and techniques to surface harden steel and the significance of selective surface hardening in manufacturing.

INSTRUCTOR REFERENCES:

Modern Materials and Manufacturing Processes - by Neely and Kibbe - published by Wiley

INSTRUCTOR EQUIPMENT/AV NEEDS:

(See back)

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Answer review questions at the end of chapter 4.

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
A.V./CHALKBOARD DIAGRAM

I. The iron-carbon diagram
   A. Hardening plain carbon steel

II. Tempering plain carbon steel

III. Heat-treating equipment

IV. Surface hardening processes
   A. Flame hardening and induction hardening
   B. Selective surface hardening
   C. Precipitation hardening

V. Annealing, recrystallization, and stress relief

OTHER INFORMATION (Grading assignments, safety, other)

Appropriate videotape:

Manufacturing Materials and Processes videotape
"Heat Treating" by Genium Publishing Corporation

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT INSTRUCTION FORM

COURSE NUMBER: 10-623-1XD DATE PREPARED: 8/90

COURSE TITLE: Materials DATE REVISED: _____

LESSON/UNIT TITLE AND/OR NUMBER:
V. Extraction and Refinement of Common Non-Metallic Materials

UNIT HRS/INST. LECTURE 1 LAB 2

INSTRUCTOR Bruce Nelson

LEARNING OBJECTIVES/COMPETENCIES

Upon successful completion of the lesson/unit, the student should be able to:

1. Identify the new materials from petrochemicals that are used to produce many synthetic materials.
2. Explain the properties of some thermomelt and thermoset plastics that are used to manufacture products.
3. State the uses for certain additives and finishes for plastic materials.
4. Relate the means by which elastomers are derived.
5. Name the uses and explain the significance of asphalts and lubricants in the manufacturing industry.
6. Demonstrate how ceramic materials are produced.
7. Assess the significance of wood materials as a manufacturing material.

INSTRUCTOR REFERENCES:

Modern Materials and Manufacturing Processes - by Neely and Kibbe - published by Wiley

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Answer review questions at the end of chapter 5.

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
A.V./CHALKBOARD DIAGRAM

I. Petrochemicals

II. Plastics (Thermosetting)
- A. Albyds
- B. Allyl plastics
- C. Aminos
- D. Epoxies
- E. Phenolics
- F. Polyesten
- G. Silicones

III. Plastics (Thermoplastic)
- A. ABS
- B. Acetals
- C. Acrylics
- D. Cellulosics
- E. Fluoroplastics
- F. Inomers
- G. Nylon
- H. Polycarbonates
- I. Polyester
- J. Polyolefins
- K. Polymide
- L. Polysulfone
- M. PVC

IV. Additives and finishes

V. Engineering properties of plastics

VI. Rubbers, elastomers and adhesives

VII. Lubricants and asphalts

VIII. Ceramic materials

IX. Wood products

OTHER INFORMATION (Grading assignments, safety, other)

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT INSTRUCTION FORM

COURSE NUMBER: 10-623-1XD DATE PREPARED: 8/90

COURSE TITLE: Materials DATE REVISED: _____

LESSON/UNIT TITLE AND/OR NUMBER:
VI. Selection and Application of Materials

UNIT HRS/INST. LECTURE 1 LAB 2

INSTRUCTOR Bruce Nelson

LEARNING OBJECTIVES/COMPETENCIES

Upon successful completion of the lesson/unit, the student should be able to:

1. Identify many metals and alloys by their numerical classification systems.
2. Describe some of the characteristics of many commonly used metals and alloys.
3. Name some of the methods used to identify and analyze various metal alloys and materials.

INSTRUCTOR REFERENCES:

Modern Materials and Manufacturing Processes - by Neely and Kibbe - published by Wiley

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Answer review questions at the end of chapter 6.

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
A.V./CHALKBOARD DIAGRAM

I. Classification systems for metals
   A. Tool steels

II. Structural steels
   A. HSLA steels

III. Stainless steels

IV. Cast irons
   A. Gray cast iron
   B. White cast iron
   C. Malleable cast iron
   D. Modular cast iron

V. Nonferrous metals

VI. Material identification

VII. Fluid analysis

VIII. Materials application

OTHER INFORMATION (Grading assignments, safety, other)

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT INSTRUCTION FORM

COURSE NUMBER: 10-623-1XD DATE PREPARED: 8/90

COURSE TITLE: Materials DATE REVISED: _____

LESSON/UNIT TITLE AND/OR NUMBER:
VII. Processes of Metals: Casting

UNIT HRS/INST. LECTURE 1 LAB 2

INSTRUCTOR Bruce Nelson

LEARNING OBJECTIVES/COMPETENCIES

Upon successful completion of the lesson/unit, the student should be able to:

1. Show how sand is prepared and used to make molds into which molten metal is cast.
2. Explain the use of patterns for sand casting.
3. Describe the principles involved in the processes of shell molding and investment casting.
4. Describe and evaluate the processes of centrifugal casting, permanent molding, and die-casting.
5. State the difference between several types of melting furnaces.
6. Show how good casting design can prevent many casting problems.

INSTRUCTOR REFERENCES:

Modern Materials and Manufacturing Processes - by Neely and Kibbe - published by Wiley

INSTRUCTOR EQUIPMENT/AV NEEDS:

(See back)

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Answer review questions at the end of chapter 7.

(9/90/ar/E1.47)

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
A.V./CHALKBOARD DIAGRAM

I. Sand casting
   A. Casting sands
   B. Preparing the sand
   C. Patterns
   D. Shrink rate
   E. Draft
   F. Cores

II. Steel casting

III. Shell molds

IV. Permanent molds

V. Centrifugal casting

VI. Investment casting
   A. Investment shell process
   B. The Shaw process

VII. Die casting
   A. Die casting machines

VIII. Furnaces and hot metal handling

IX. Casting design and problems

OTHER INFORMATION (Grading assignments, safety, other)

Appropriate Videotape:

Manufacturing Materials and Processes videotape
"Casting" by Genium Publishing Corporation

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT INSTRUCTION FORM

COURSE NUMBER: 10-623-1XD DATE PREPARED: 8/90

COURSE TITLE: Materials DATE REVISED: _____

LESSON/UNIT TITLE AND/OR NUMBER: UNIT HRS/INST. LECTURE 1 LAB 2
VIII. Processing of Metals: Hot Working
INSTRUCTOR Bruce Nelson

LEARNING OBJECTIVES/COMPETENCIES

Upon successful completion of the lesson/unit, the student should be able to:

1. Explain how molten steel is transformed into industrial shapes.
2. Show the significance of recrystallization and grain structure of hot rolling and forging.
3. Describe several methods of hot forming metals and explain their advantages.
4. Describe two methods of hot forming pipe and tubing.

INSTRUCTOR REFERENCES:

Modern Materials and Manufacturing Processes - by Neely and Kibbe - published by Wiley

INSTRUCTOR EQUIPMENT/AV NEEDS:

(See back)

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Answer review questions at the end of chapter 8.

(9/90/ar/E1.49)

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
A.V./CHALKBOARD DIAGRAM

I. Hot rolling
   A. Rolling mills

II. Strand casting
   A. Recrystallization

III. Forging processes
   A. Forging machines

IV. Swaging

V. Hot extrusion

VI. Hot drawing

VII. Hot spinning

VIII. Seamless tubing

IX. Pipe welding

OTHER INFORMATION (Grading assignments, safety, other)

Appropriate Videotape:

Manufacturing Materials and Processes videotape
"Forging" by Genium Publishing Corporation

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT INSTRUCTION FORM

COURSE NUMBER: 10-623-1XD DATE PREPARED: 8/90

COURSE TITLE: Materials DATE REVISED: _____

LESSON/UNIT TITLE AND/OR NUMBER: UNIT HRS/INST. LECTURE 1 LAB 2
IX. Processing of Metals: Cold Working

INSTRUCTOR Bruce Nelson

LEARNING OBJECTIVES/COMPETENCIES

Upon successful completion of the lesson/unit, the student should be able to:

1. Explain the effects of cold working on metals.
2. Describe how hot rolled steel is prepared and cold finished in steel mills.
3. List a number of cold forming operations and explain their principles, advantages, and uses.

INSTRUCTOR REFERENCES:

Modern Materials and Manufacturing Processes - by Neely and Kibbe - published by Wiley

INSTRUCTOR EQUIPMENT/AV NEEDS:

(See back)

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Answer review questions at the end of chapter 9.

(9/90/ar/E1.52)

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
A.V./CHALKBOARD DIAGRAM

I. Factors in cold working
   A. Elastic recovery
   B. Ductility and Molleability
   C. Preparing hot rolled steel for cold rolling

II. Cold rolling in the steel mill
   A. Surface coating on steel

III. Blanking and pressing

IV. Drawing, forming, and extruding metal
   A. Bar, tube, and wire drawing
   B. Cold forming
   C. Cold extrusion

V. Bending, straightening, and roll forming

VI. Metal spinning and flow forming

OTHER INFORMATION (Grading assignments, safety, other)

Appropriate Videotape:

Manufacturing Materials and Processes videotape
"Rolling" by Genium Publishing Corporation

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT INSTRUCTION FORM

COURSE NUMBER: 10-623-1XD DATE PREPARED: 8/90

COURSE TITLE: Materials DATE REVISED: _____

LESSON/UNIT TITLE AND/OR NUMBER: X. Powder Metallurgy

UNIT HRS/INST. LECTURE 1 LAB 2

INSTRUCTOR Bruce Nelson

LEARNING OBJECTIVES/COMPETENCIES

Upon successful completion of the lesson/unit, the student should be able to:

1. Understand and explain the processes involved in simple die construction.
2. Explain the methods by which metal powders are produced.
3. Describe the metallurgical principles involved in bonding of powders in the sintering process.

INSTRUCTOR REFERENCES:

Modern Materials and Manufacturing Processes - by Neely and Kibbe - published by Wiley

INSTRUCTOR EQUIPMENT/AV NEEDS:

(See back)

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Answer review questions at the end of chapter 10.

(9/90/ar/E1.54)

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
A.V./CHALKBOARD DIAGRAM

I. How powdered metal parts are made

II. Metal powders

III. Compaction of powders
  A. Advanced processes
  B. Powder forging
  C. Metal powder injection molding
  D. Metal powder-to-strip technology
  E. Powder extrusion

IV. Sintering

V. Secondary operations

VI. Powdered metal products and their uses

VII. Factors for design of powdered metal products

OTHER INFORMATION (Grading assignments, safety, other)

Appropriate Videotape:

Manufacturing Materials and Processes videotape
"Powder Metallurgy" by Genium Publishing Corporation

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT INSTRUCTION FORM

COURSE NUMBER: 10-623-1XD DATE PREPARED: 8/90

COURSE TITLE: Materials DATE REVISED: _____

LESSON/UNIT TITLE AND/OR NUMBER: XI. Principles of Machining Processes

UNIT HRS/INST. LECTURE 1 LAB 2

INSTRUCTOR Bruce Nelson

LEARNING OBJECTIVES/COMPETENCIES

Upon successful completion of the lesson/unit, the student should be able to:

1. Describe some principles and standards of measurement, and explain the uses of most measuring instruments used in machining.
2. Understand the principles of metal removal in machining and explain the characteristics and uses of various tool materials.
3. Show why cutting fluids are used and explain their special characteristics.

INSTRUCTOR REFERENCES:

Modern Materials and Manufacturing Processes - by Neely and Kibbe - published by Wiley

INSTRUCTOR EQUIPMENT/AV NEEDS:

(See back)

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Answer review questions at the end of chapter 11.

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
A.V./CHALKBOARD DIAGRAM

I. Measuring systems
   A. Standards of measuring
   B. Measuring tools
   C. Semi precision measuring tools
   D. Precision measuring tools
   E. Tolerances and fits

II. Principles of machining and metal removal
   A. Carbide tools
   B. High speed steel tools
   C. Tool geometry
   D. Chip control
   E. Milling cutters
   F. Drills, taps, reamers
   G. Work materials and their effects
   H. Speeds and feeds
   I. Cutting fluids

OTHER INFORMATION (Grading assignments, safety, other)

Appropriate Videotape:

Manufacturing Materials and Processes videotape
"Gages and Measurement" and "Surface Control" by Genium Publishing Corporation

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT INSTRUCTION FORM

COURSE NUMBER: 10-623-1XD DATE PREPARED: 8/90

COURSE TITLE: Materials DATE REVISED: _____

LESSON/UNIT TITLE AND/OR NUMBER: XII. Machine Tool Operations

UNIT HRS/INST. LECTURE 1 LAB 2

INSTRUCTOR Bruce Nelson

LEARNING OBJECTIVES/COMPETENCIES

Upon successful completion of the lesson/unit, the student should be able to:

1. Describe when to use tool room machinery and when to use production machinery for making a part.
2. Decide which type of drilling or sawing machine is needed for certain drilling or sawing operations.
3. Explain the special uses of vertical and horizontal spindle turning, milling, and boring machines.
4. State how machine threads are cut and how they are designated.
5. Describe the processes of making many kinds of gears and spindles.
6. State the principles and uses of abrasive machining.

INSTRUCTOR REFERENCES:

Modern Materials and Manufacturing Processes - by Neely and Kibbe - published by Wiley

INSTRUCTOR EQUIPMENT/AV NEEDS:

(See back)

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Answer review questions at the end of chapter 12.

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
A.V./CHALKBOARD DIAGRAM

I. Basic machine tools
   A. Sawing machines
   B. Drilling machines

II. Turning machines (lathes)
   A. Thread cutting
   B. Lathe workholding devices
   C. Turning operations
   D. Turret lathes, automatic screw machines

III. Vertical turning machines

IV. Horizontal boring mills

V. Milling operations and equipment

VI. Shapers and planers

VII. Broaching

VIII. Gears and gear cutting operations

IX. Abrasive machining

X. Honing, lapping and superfinishing

OTHER INFORMATION (Grading assignments, safety, other)

Appropriate Videotapes:

Manufacturing Materials and Processes videotapes
"The English Lathe"
"Abrasive Machining"
"Milling"
"Broaching and Shaping"
"Drilling and Boring"

By Genium Publishing Corporation

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT INSTRUCTION FORM

COURSE NUMBER: 10-623-1XD DATE PREPARED: 8/90

COURSE TITLE: Materials DATE REVISED:

LESSON/UNIT TITLE AND/OR NUMBER:
XIII. Nontraditional Machining Processes

UNIT HRS/INST. LECTURE 1 LAB 2

INSTRUCTOR Bruce Nelson

LEARNING OBJECTIVES/COMPETENCIES

Upon successful completion of the lesson/unit, the student should be able to:

1. List common nontraditional machining processes.
2. Describe in general terms how these processes work.
3. Describe applications of the processes.

INSTRUCTOR REFERENCES:

Modern Materials and Manufacturing Processes - by Neely and Kibbe - published by Wiley

INSTRUCTOR EQUIPMENT/AV NEEDS:

(See back)

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Answer review questions at the end of chapter 13.

(9/90/ar/E1.60)

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
A.V./CHALKBOARD DIAGRAM

I. Electrodischarge machining
   A. EDM electrodes
   B. Wirecut EDM
   C. Advantages and applications of EDM

II. Electrochemical machining
   A. Application of ECM

III. Electrolytic grinding

IV. Lasers and laser machining

V. Ultrasonic machining

VI. Hydrojet machining

VII. Electron beam machining

VIII. Plasma technology

OTHER INFORMATION (Grading assignments, safety, other)

Appropriate Videotapes:

Manufacturing Materials and Processes videotapes
"Electrical Discharge Machines"
"Laser Drilling"
"Electrochemical Machining"
"Electrochemical Grinding"

By Genium Publishing Corporation

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT INSTRUCTION FORM

COURSE NUMBER: 10-623-1XD DATE PREPARED: 8/90

COURSE TITLE: Materials DATE REVISED: _____

LESSON/UNIT TITLE AND/OR NUMBER: XIV. Joining Processes

UNIT HRS/INST. LECTURE 1 LAB 2

INSTRUCTOR Bruce Nelson

LEARNING OBJECTIVES/COMPETENCIES

Upon successful completion of the lesson/unit, the student should be able to:

1. List common methods of joining materials and cite advantages and disadvantages of them.
2. List common welding processes and describe how they work and what their general applications are.

INSTRUCTOR REFERENCES:

Modern Materials and Manufacturing Processes - by Neely and Kibbe - published by Wiley

INSTRUCTOR EQUIPMENT/AV NEEDS:

(See back)

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Answer review questions at the end of chapter 14.

(9/90/ar/E1.62)

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
A.V./CHALKBOARD DIAGRAM

I. Mechanical Fasteners
   A. Threaded fasteners
   B. Nails and staples
   C. Rivets
   D. Stitching, tying, snaps
   E. Pins, rings, pressing, crimping
   F. Specialty fastening systems

II. Adhesive bonding
   A. Bonding materials
   B. Aircraft bonding technology

III. Welding processes
   A. Oxy-acetylene welding
   B. Electric welding
   C. MIG and TIG welding
   D. Resistance and forge welding
   E. Laser welding

IV. Soldering and brazing

V. Plastic welding

OTHER INFORMATION (Grading assignments, safety, other)

Appropriate Videotapes:

Manufacturing Materials and Processes videotapes
"Soldering and Brazing"
"Introduction to Joining"
"Welding"

By Genium Publishing Corporation

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT INSTRUCTION FORM

COURSE NUMBER: 10-623-1XD DATE PREPARED: 8/90

COURSE TITLE: Materials DATE REVISED: _____

LESSON/UNIT TITLE AND/OR NUMBER:
XV. Plastics and Composite Processing

UNIT HRS/INST. LECTURE 1 LAB 2

INSTRUCTOR Bruce Nelson

LEARNING OBJECTIVES/COMPETENCIES

Upon successful completion of the lesson/unit, the student should be able to:

1. Identify common methods of processing plastics and composites.
2. Describe in general terms how the processes work.

INSTRUCTOR REFERENCES:

Modern Materials and Manufacturing Processes - by Neely and Kibbe - published by Wiley

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Answer review questions at the end of chapter 15.

(9/90/ar/E1.64)

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF A.V./CHALKBOARD DIAGRAM

I. Plastic and composite products

II. Plastics and composite processing methods
   A. Blow molding
   B. Injection molding
   C. Extrusion
   D. Compression molding
   E. Transfer molding
   F. Rotational molding
   G. Solvent molding
   H. Reinforced plastic materials

III. Manufacturing and processing composite materials
   A. Composite manufacturing methods

IV. Composite application

V. Tool and die making for plastic and composite processing

OTHER INFORMATION (Grading assignments, safety, other)

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT INSTRUCTION FORM

COURSE NUMBER: 10-623-1XD DATE PREPARED: 8/90

COURSE TITLE: Materials DATE REVISED:

LESSON/UNIT TITLE AND/OR NUMBER: XVI. Corrosion and Protection for Materials

UNIT HRS/INST. LECTURE 1 LAB 2

INSTRUCTOR Bruce Nelson

LEARNING OBJECTIVES/COMPETENCIES

Upon successful completion of the lesson/unit, the student should be able to:

1. Discuss the causes of corrosion
2. Describe the various ways in which corrosion may be slowed or prevented.

INSTRUCTOR REFERENCES:

Modern Materials and Manufacturing Processes - by Neely and Kibbe - published by Wiley

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

(See back)

LIST OF EVALUATION MEASURES:

Answer review questions at the end of chapter 16.

(9/90/ar/E1.66)

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
A.V./CHALKBOARD DIAGRAM

I. Corrosion in metals

II. Protection methods
   A. Cladding
   B. Alloying
   C. Oxidizing
   D. Plating
   E. Painting

III. Material preparation for surface protection
   A. Mechanical methods
   B. Chemical processes for cleaning and surface preparation

OTHER INFORMATION (Grading assignments, safety, other)

Appropriate Videotapes:

Manufacturing Materials and Processes videotapes
"Cleaning"
"Introduction to Coatings"
"Thermal Spray"
"Diffusion Coatings"
"Electroplating"
"Finishing and Deburring"

By Genium Publishing Corporation

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT INSTRUCTION FORM

COURSE NUMBER: 10-623-1XD DATE PREPARED: 8/90

COURSE TITLE: Materials DATE REVISED: _____

LESSON/UNIT TITLE AND/OR NUMBER: XVII. Processing Other Industrial Materials

UNIT HRS/INST. LECTURE 1 LAB 2

INSTRUCTOR Bruce Nelson

LEARNING OBJECTIVES/COMPETENCIES

Upon successful completion of the lesson/unit, the student should be able to:

1. Be generally familiar with common industrial materials other than metal and plastic.
2. Be familiar with their manufacturing processes.

INSTRUCTOR REFERENCES:

Modern Materials and Manufacturing Processes - by Neely and Kibbe - published by Wiley

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Answer review questions at the end of chapter 17.

(9/90/ar/E1.68)

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
A.V./CHALKBOARD DIAGRAM

I. Glass

II. Ceramics

III. Wood, wood products, and paper

IV. Fabrics

V. Rubber

VI. Natural material

VII. Construction material

OTHER INFORMATION (Grading assignments, safety, other)

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline

06/30/89

COURSE TITLE	Basic Statistics		
COURSE NUMBER	10-804-1XB	CLASSROOM PRESENTATIONS	(A) 36.00
SEMESTER HOURS	36	LAB/CLINICAL/SHOP EXPERIENCE	(B) 2.00
CREDITS	2.00	INDIVIDUAL/INDEPENDENT INSTRUCTION	(C)
CEU'S		SIMULATED/ACTUAL OCCUPATIONAL EXP	(D)
CEC'S		ON-THE-JOB EXPERIENCE	(E)

COURSE DESCRIPTION:

A course in descriptive statistics that emphasizes data gathering and organization in the form of statistical tables, charts, histograms, Pareto and scatter diagrams. It also presents measures of central tendency including the mean, median, mode, and measures of dispersion with an introduction to the normal distribution.

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. To summarize data using line charts, bar charts, pie charts.
2. Graphically present frequency distribution data in the form of a histogram or frequency polygon.
3. Calculate quantitative measures of central tendency such as the mean, median, and mode for ungrouped and grouped data (frequency distribution).
4. Use percentages to summarize qualitative data.
5. Calculate measures of variability (or dispersion) such as range, variance, and standard deviation.
6. Construct scatter diagrams to demonstrate causal relationships.
7. Correctly interpret skewness in frequency distribution.
8. Relate central tendency to the normal distribution.
9. Construct Pareto diagrams to help indicate which problem to solve first in eliminating defect.
10. Select the correct random sample size.

PREPARED BY: Gene Lorenz
COORD. APPROVAL: George-Pratt
DISTRICT APPROVAL: Lois Eichman

SUBMITTED BY: Bill Rhiger
DATE: REVISED:
DATE:

COURSE TITLE: Basic Statistics
COURSE NUMBER: LO-264-1XB

2
08/30/67

COURSE OUTLINE BY UNITS:

	TYPE OF HOURS -A-	-B-
I. Introduction	2.00	
A. Overview of Descriptive Statictics		
B. Data and Data Gathering		
1. Attribute and quantitative variables (scales of measurement)		
2. Populations and samples		
C. Statistical Symbols		
II. Organization of Data	15.00	
A. Stastistical Tables		
B. Line Charts		
C. Bar Charts		
D. Pie Charts		
E. Histograms		
1. Frequency tables		
F. Pareto Diagrams		
G. Scatter Diagrams		
1. Causal relationships		
III. Measures of Central Tendency - Dispersion, Skewness	15.00	
A. Arithmetic Mean		
1. Grouped data		
2. Ungrouped data		
B. Median		
C. Mode		
D. Dispersion		
1. Deviation		
a. grouped data		
b. ungrouped data		
2. Range		
a. grouped data		
b. ungrouped data		
E. Skewness		
IV. Normal Distribution	4.00	
A. Standard scores		
B. Areas (proportions) under a normal curve		
C. Proportions between z -scores		
Totals	36.00	0

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

Guide to Quality Control - Dr. Kasru Ishikawa, Asian Productivity Organization
Statistics (A Fresh Approach) - Sanders, Eng, Murph, McGraw-Hill
Statistical Quality Assurance - Gulder, Delmar
Basic Statistics - Spatz, Johnston, Brooks/Cole
Schaum's Outline Series - Theory and Problems of Statistics, Spiegel, McGraw-Hill
Introduction of Probability and Statistics - Mendenhall, Duxbury

CAMPUS: Rice Lake DATE PREPARED: _____

PROGRAM: _____ DATE REVISED: _____

INSTRUCTOR: Gene Lorenz DATE REVISED: _____

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT PLAN OF INSTRUCTION

COURSE TITLE: Basic Statistics COURSE NUMBER: 10-894-1XB

LESSON/UNIT NO.: 1 TITLE: Introduction

TIME (APPROXIMATE) LECTURE: 2 hrs

LABORATORY: _____

I. OBJECTIVES/COMPETENCIES

Upon successful completion of this lesson/unit, the student should be able to:

1. Explain the meaning of the term "descriptive statistics."
2. Explain the meaning of the term "statistical inference."
3. Explain the meaning of the term "sample."
4. Explain the meaning of the term "population."
5. Explain the difference between a sample and a population.
6. Explain the concept of a "random sample."
7. Explain the difference between attribute and quantitative variables.
8. Explain the difference between parameter and statistic.
9. Explain the meaning of various statistical symbols such as x, u,

II. PRESENTATION OUTLINE

	REQUIRED SOURCES
A. Descriptive statistics versus inferential statistics	Chap 1 Sanders
B. Populations and parameters, samples and statistics	Chap 1 Spatz
C. Random samples (description)	Chap 1 Sanders
D. Scales of measurement - nominal, ordinal interval and ratio scales.	
E. Qualitative (attribute) and quantitative variables	Chap 1 Sanders
F. Discrete and continuous variables	Chap 1 Sanders
G. Overview of statistical symbols x, u, , , , ,	Chap 1 Sanders
	Chap 1 Spatz
	Lecture
	Presentation

III. STUDENT EVALUATION

Teacher prepared quiz.

IV. ADDITIONAL RESOURCE MATERIALS

Chap 1 Statistics - A Fresh Approach, Sanders, Eng, Murph, McGraw-Hill
Chap 2 Basic Statistics - Spatz, Johnston, Brooks/Cole

Use additional pages if more space is needed.

CAMPUS: Rice Lake DATE PREPARED: _____

PROGRAM: _____ DATE REVISED: _____

INSTRUCTOR: Gene Lorenz DATE REVISED: _____

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT PLAN OF INSTRUCTION

COURSE TITLE: Basic Statistics COURSE NUMBER: 10-804-1XB

LESSON/UNIT NO.: 2 TITLE: Organization of Data

TIME (APPROXIMATE) LECTURE: 15 hrs.

LABORATORY: _____

I. OBJECTIVES/COMPETENCIES

Upon successful completion of this lesson/unit, the student should be able to:

Define and use the terms arithmetic mean, median, mode.

Use appropriate data to construct:

1. statistical tables
2. line charts
3. bar charts
4. pie charts
5. histograms
6. stem and leaf displays

Use appropriate data to construct and interpret Pareto charts.

Use appropriate data to construct scatter diagrams to show causal relationships.

II. PRESENTATION OUTLINE

		REQUIRED SOURCES
A.	Statistical tables-efficient representation of classified data - (1) mean, median, mode, percentages	Chap 2 Ref #1 Sanders
B.	Line charts - used in conjunction with statistical tables or as stand alone representation of data	" "
C.	Bar charts - used in conjunction with statistical tables or as stand alone representation of data	" "
D.	Pie charts - use to represent data by showing component parts of a whole	" "
E.	Data gathering (1) check sheets (2) data list (3) one-way tally sheet (4) two-way tally sheet	Chap 4 Ref #5 Kaorulshikawa
F.	Histograms - bar charts of frequency distribution (i.e. data represented by a sample of measurements)	Chap 2 Ref #1 Sanders
G.	Stem and leaf displays - use to show data distribution	Chap 1 Ref #6 Mendenhall
H.	Scatter diagrams - use to show causal relationships between two variables	Chap 9 Ref #5 Kaorulshikawa
I.	Pareto Analysis (a) data collection (b) rank catagories by size (c) construct a pareto chart	Chap 5 Ref #5 Kaorulshikawa

Lecture Presentation
Microcomputer with appropriate software

III. STUDENT EVALUATION

Teacher prepared problems for daily assignments

Teacher prepared quiz and test

IV. ADDITIONAL RESOURCE MATERIALS

Chap 2 Statistics - a Fresh Approach, Sanders, Eng, Murph, McGraw-Hill

Chap 10 Statistical Quality Assurance, Guldner, Delmar

CON'T.

Use additional pages if more space is needed.

Additional Resource Materials Con't.

Chap 1 Schaum's Outline Series - Theory and Problem of Statistics 2nd Edition, Spiegel, McGraw-Hill

Chap 1 Introdution to Probability and Statistics, Mendenhall, Duxbury

Chap 2 Guide to Quality Control, Kaorulshikawa, Asian Productivity
Chap 5 Organization

Introduction to Probability and Statistics, Mendenhall 7th Edition, Duxbury

CAMPUS: Rice Lake DATE PREPARED: _____

PROGRAM: _____ DATE REVISED: _____

INSTRUCTOR: Gene Lorenz DATE REVISED: _____

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT PLAN OF INSTRUCTION

COURSE TITLE: Basic Statistics COURSE NUMBER: 10-804-1XB

LESSON/UNIT NO.: 3 TITLE: Measurer of Central Tendency - Dispersion - Skewness

TIME (APPROXIMATE) LECTURE: 15 hrs.

LABORATORY: _____

I. OBJECTIVES/COMPETENCIES

Upon successful completion of this lesson/unit, the student should be able to:

1. Construct a data array from raw data.
2. Compress the data to provide a frequency distribution.
3. Construct histograms or frequency polygons from the component data.
4. Construct cumulative frequency distribution and ogive curves.
5. Calculate the arithmetic mean for both grouped and ungrouped data.
6. Calculate the median for grouped and urgrouped data.
7. Calculate the mode for grouped and ungrouped data.
8. Calculate the range, average deviation and standard deviation for both grouped and ungrouped data.
9. Calculate Quartile Deviation for a distribution.
10. Calculate the coefficient of variation for a distribution.
11. Calculate the coefficient of skewness for a distribution
12. Approximate the standard deviation using the range approximation.
13. Use z scores to check for faulty observation (outliers).

II. PRESENTATION OUTLINE

	REQUIRED SOURCES
A. Arranging raw data to construct frequency polygons and histograms	Chap 3 Sanders
B. Cummulative frequency diagrams - ogive curves	" "
C. Measures of cnetral tendency - grouped & ungrouped data	" "
a. arithmetic mean	
b. median	
c. mode	" "
D. Measures of dispersion - grouped & ungrouped data	Chap 4 Sanders
a. range	
b. average deviation	
c. standard deviation, variance	
d. Range approximation of standard deviation	" "
e. Tchebysheffs Theorem	Chap 2 Mendenhall
f. Empirical Rule	" "
g. Percentile and quartile deviation	Chap 3 Sanders
h. Relative dispersion - coefficient of variation	" "
i. Measure of skewness - coefficient of skewness	" "

Lecture presentation
Text and teacher prepared material

III. STUDENT EVALUATION

Text and teacher prepared problems for daily assignments.

Teacher prepared quiz and tests.

IV. ADDITIONAL RESOURCE MATERIALS

Chap 3 & 4 Statistics - a Fresh Approach, Sanders, Eng, Murph, McGraw-Hill

Chap 2 Introduction to Probability and Statistics, Mendenhall, Duxbury

Chap 3 Schaum's Outline Series - Theory and Problems of Statistics 2nd Edition, Spiegel, McGraw-Hill

Use additional pages if more space is needed.

CAMPUS: Rice Lake DATE PREPARED: _____

PROGRAM: _____ DATE REVISED: _____

INSTRUCTOR: Gene Lorenz DATE REVISED: _____

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT PLAN OF INSTRUCTION

COURSE TITLE: Basic Statistics COURSE NUMBER: 10-804-1XB

LESSON/UNIT NO.: 4 TITLE: Normal Distribution

TIME (APPROXIMATE) LECTURE: 4 hrs.

LABORATORY: _____

I. OBJECTIVES/COMPETENCIES

Upon successful completion of this lesson/unit, the student should be able to:

1. Explain the term normal distribution.
2. Calculate z scores and explain their relationship to the standardized normal curve.
3. Explain the relationship of the mean, median and mode as it pertains to the normal curve.
4. Use the table for areas under the normal curve to find proportions corresponding to given z -scores.

II. PRESENTATION OUTLINE

REQUIRED SOURCES

A. Normal distributions and normal curves
   1. unimodel symetric curves

B. Standardized normal curves
   1. standard scores (z -scores)

C. Area under a normal curve

D. Areas (proportions) between z -scores.

E. Problems relating to normal distributions and normal curves.

See resource materials listed below

Lecture presentation

III. STUDENT EVALUATION

Text and teacher prepared problems for daily assignments.

Teacher prepared unit test.

IV. ADDITIONAL RESOURCE MATERIALS

Chap 4 & 5 Statistics - a Fresh Approach, Sanders, Eng, Murph, McGraw-Hill

Chap 4 & 6 Basic Statistics - Tales of Distribution, Spatz, Johnston Brooks/Cole

Chap 2 Statistical Quality Assurance, Guldner, Delmar

Use additional pages if more space is needed.

C:\99\1X1\CO\PRINT.COURSE\SUBMIT

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline 06/30/89

COURSE TITLE	Print Reading			
COURSE NUMBER	10-699-1X1	CLASSROOM PRESENTATIONS	(A)	27.00
SEMESTER HOURS	36	LAB/CLINICAL/SHOP EXPERIENCE	(B)	9.00
CREDITS	2.00	INDIVIDUAL/INDEPENDENT INSTRUCTION	(C)	
CEU'S		SIMULATED/ACTUAL OCCUPATIONAL EXP	(D)	
CEC'S		ON-THE-JOB EXPERIENCE	(E)	

COURSE DESCRIPTION:
This course will cover the basic principles of print reading. The emphasis will be on the interpreting of standard lines and symbols in single and multiple view drawings.

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. Locate and interpret title block information, zoning, revisions.
2. Identify and describe basic line, orthographic views, sectional views, auxiliary views and isometric views.
3. Demonstrate a working knowledge of units of measurement used on a blueprint and convert fractions to decimals.
4. Locate and identify various material symbols and machining symbols.
5. Identify and interpret size and location dimensions and locate and read dimensioning notes.
6. Sketch orthographic and isometric views of objects.

PREPARED BY: SUBMITTED BY:
COORD. APPROVAL: DATE: REVISED:
DISTRICT APPROVAL: DATE:

COURSE TITLE: Print Reading
COURSE NUMBER. 10-899-1X1

COURSE OUTLINE BY UNITS:

		TYPE OF HOURS -A-	-B-
I.	Introduction	2.00	
	A. Basis for interpreting blueprints and sketches		
	B. International organizations for standardization		
II.	Lines	2.00	
	A. Object lines		
	B. Dimension lines		
	C. Center lines		
	D. Hidden lines		
	E. Other lines		
III.	Views	6.00	
	A. Orthographic projection theory		
	1. one-view drawings		
	2. multi-view drawings		
	B. Auxiliary view drawings		
	C. Arrangement of views		
IV.	Dimensions and Notes	8.00	2.00
	A. Construction, size and location dimensions		
	B. Dimensioning geometric shapes		
	C. Dimensioning methods		
	1. aligned		
	2. unidirectional		
	3. tolerances		
	4. callouts for threads, tapers, and machined surfaces		
	5. Dimensioning with shop notes		
V.	Sections	6.00	
	A. Cutting planes and full sections		
	B. Half sections, partial sections and conventional breaks		
VI.	Sketching	1.00	3.00
	A. Sketching lines, circles and irregular shapes		
	B. Lettering		
	C. Orthographic sketching		
VII.	Interpreting Drawings	2.00	4.00
	A. Details		
	B. Assemblies		
	C. Bill of materials		
	D. Machine specification		
	E. Drawing changes		
	F. Specialized prints		
	Totals	27.00	9.00

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline

COURSE TITLE	Print Reading			
COURSE NUMBER	10-699-1X1	CLASSROOM PRESENTATIONS	(A)	27.00
SEMESTER HOURS	36	LAB/CLINICAL/SHOP EXPERIENCE	(B)	9.00
CREDITS	2.00	INDIVIDUAL/INDEPENDENT INSTRUCTION	(C)	
CEU'S		SIMULATED/ACTUAL OCCUPATIONAL EXP	(D)	
CEC'S		ON-THE-JOB EXPERIENCE	(E)	

COURSE DESCRIPTION:
This course will cover the basic principles of print reading. The emphasis will be on the interpreting of standard lines and symbols in single and multiple view drawings.

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. Locate and interpret title block information, zoning, revisions.
2. Identify and describe basic line, orthographic views, sectional views, auxiliary views and isometric views.
3. Demonstrate a working knowledge of units or measurement used on a blueprint and convert fractions to decimals.
4. Locate and identify various material symbols and machining symbols.
5. Identify and interpret size and location dimensions and locate and read dimensioning notes.
6. Sketch orthographic and isometric views of objects.

PREPARED BY: SUBMITTED BY:
COORD. APPROVAL: DATE: REVISED:
DISTRICT APPROVAL: DATE:

COURSE TITLE: Print Reading
COURSE NUMBER: 10-699-1X1

COURSE OUTLINE BY UNITS:	TYPE OF HOURS A	B
I. Introduction	2.0	
A. Basis for interpreting blueprints and sketches		
B. International organizations for standardization		
II. Lines	2.0	
A. Object lines		
B. Dimension lines		
C. Center lines		
D. Hidden lines		
E. Other lines		
III. Views	6.0	
A. Orthographic projection theory		
1. one-view drawings		
2. multi-view drawings		
B. Auxiliary view drawings		
C. Arrangement of views		
IV. Dimensions and Notes	8.0	2.0
A. Construction, size and location dimensions		
B. Dimensioning geometric shapes		
C. Dimensioning methods		
1. aligned		
2. unidirectional		
3. tolerances		
4. callouts for threads, tapers, and machines surfaces		
5. dimensioning with shop notes		
V. Sections	6.0	
A. Cutting planes and full sections		
B. Half sections, partial sections and conventional breaks		
VI. Sketching	1.0	3.0
A. Sketching lines, circles and irregular shapes		
B. Lettering		
C. Orthographic sketching		
VII. Interpreting Drawings	2.0	4.0
A. Details		
B. Assemblies		
C. Bill of materials		
D. Machine specification		
E. Drawing changes		
F. Specialized prints		
Totals	27.0	9.0

COURSE TITLE: Print Reading
COURSE NUMBER: 10-699-1X1

TYPE OF HOURS
A B

COURSE OUTLINE BY UNITS:

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-699-1X1 HRS/INSTRUCTION: LECTURE 2 LAB ____

COURSE TITLE: Print Reading DATE PREPARED: 6-90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit I - Introduction to Print Reading DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Locate and interpret title block information.
2. Convert the basic units of measurement for fractional inch, decimal inch, and metric system.
3. Read fractional rule, decimal, and metric rule.

REFERENCES:

1. Handout - Decimal and Millimeter Equivalent Sheet
2. Handout - Reading Fractional - Inch Rules
3. Handout - Reading and Writing Decimal Fractions
4. Handout - Abbreviations Reference Sheet

INSTRUCTOR EQUIPMENT/AV NEEDS:

Overhead projector

STUDENT MATERIALS:

Basic Blueprint Reading and Sketching, 5th edition, C. Thomas Olivo, Delmar Publishing Inc., 1988

LIST OF EVALUATION MEASURES:

Fractional, decimal, and metric scale assignments

INSTRUCTOR PRESENTATION OUTLINE:	REFERENCE NO. OF AV-CHALKBOARD DIAGRAM
I. Title Block Information A. Part name B. Quantity C. Print number D. Date E. Scale F. Draftsperson's name G. Dimensional limits H. Part material I. Company name and city	File folder of Size A drawings and title blocks transparencies of various companies.
II. Reading and Interpreting Scales A. Fractional-inch rule B. Decimal-inch rule C. Metric rule	Transparencies of each rule.

OTHER INFORMATION (Grading practices, safety, other)

Two hours of homework on assignments outside of class.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-699-1X1 HRS/INSTRUCTION: LECTURE 2 LAB ____

COURSE TITLE: Print Reading DATE PREPARED: 6-90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit II The Alphabet of Lines DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Identify the following basic lines used on industrial prints: object, hidden, center, extension, dimension, projection, and combination of lines.

REFERENCES:

Handout of Alphabet of Lines - Figure 2.15 and p. 15

INSTRUCTOR EQUIPMENT/AV NEEDS:

Overhead projector

STUDENT MATERIALS:

Text, pp. 7-17

LIST OF EVALUATION MEASURES:

BP-2, BP-3, BP-4A, BP-4B, BP-5, Vee Block Quiz

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF AV-CHALKBOARD DIAGRAM

I. Alphabet of Lines
   A. Object
   B. Hidden
   C. Center
   D. Extension
   E. Dimension
   F. Projection
   G. Other Lines
      1. Cutting plane
      2. Break
      3. Phantom
   H. Combination of center and dimension
   I. Precedence of lines

Overhead projector - Example drawing using all the various lines.

OTHER INFORMATION (Grading practices, safety, other)

Two hours of homework on completion of BP-2, BP-3, BP-4A, BP-4B, BP-5

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-699-1X1 HRS/INSTRUCTION: LECTURE 6 LAB ___

COURSE TITLE: Print Reading DATE PREPARED: 6-90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit III Views DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Interpret three view drawings by understanding the theory of orthographic projection.
2. Identify the arrangement of views.
3. Recognize and identify one and two view drawings of parts.
4. Interpret auxiliary view drawings.

REFERENCES:
Handout 3 - Active involvement sheets on McGraw Hill filmstrips to be completed by students in class during filmstrips.

INSTRUCTOR EQUIPMENT/AV NEEDS:
Filmstrip Projector - 3 McGraw Hill filmstrips - Orthographic Projection Part I and Part II, Isometric Projection. One filmstrip on Auxiliary Views and cassette tape.

STUDENT MATERIALS:
Text, pp. 18-41

LIST OF EVALUATION MEASURES:
BP-6A, BP-6B, BP-7, BP-8A, BP-8B, BP-8C, BP-9, A-8, A-9

Text #1 - A-11 Feed Hopper and p. 62 and p. 68, R. Schultz
BP-10

INSTRUCTOR PRESENTATION OUTLINE:	REFERENCE NO. OF AV-CHALKBOARD DIAGRAM
I. Theory of Orthographic Projection A. Three view drawings B. Isometric drawings	McGraw Hill Filmstrip Part I, and Isometric Projection and active involvement sheets
II. Arrangement of Views A. 1st angle B. 2nd angle	Overhead Projector Figure 21-2 and p. 41
III. Two view and one view drawings	McGraw Hill Filmstrip Part II and active involvement sheets
IV. Test #1 A-11 Feed Hopper - p. 29 Jensen, p. 62 and p. 68, R. Schultz	
V. Auxiliary Views	McGraw Hill Filmstrip Auxiliary Views and active involvement sheets

OTHER INFORMATION (Grading practices, safety, other)

Six hours of homework outside of class.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-699-1X1 HRS/INSTRUCTION: LECTURE 8 LAB 2

COURSE TITLE: Print Reading DATE PREPARED: 6-90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit IV Dimensions and Notes DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Identify the construction dimensions of size and location.
2. Calculate missing dimensions from other given dimensions on prints.
3. Recognize and interpret dimensions of common geometric shapes such as: cylinders, circles, arcs, angles, bolt circles, tapers, internal and external threads.
4. Recognize and interpret the following dimensioning methods of aligned, unidirectional, datum or baseline and tabular.
5. Complete calculations of tolerances with maximum and minimum limits, accumulative tolerances, clearance, and interference fits.
6. Read and interpret notes for the following shop processes: drilling, counterboring, countersinking, chamfers, grooves, knurling, reaming, boring, and keyways.

REFERENCES:
Handout - Active involvement sheet to accompany Dimension Part I and Part II filmstrips.
Handout - American National, Unified, and Metric Screw Thread Table; Giesecke, Appendix 10
Handout - p. 64, Jensen

INSTRUCTOR EQUIPMENT/AV NEEDS:
Filmstrip Projector
McGraw Hill Filmstrips: 1. Dimensioning-Part I; 2. Dimensioning-Part II; 3. Threads
Overhead Projector - Tolerancing Problems

STUDENT MATERIALS:

Text, pp. 42-93, Tolerance Worksheet

LIST OF EVALUATION MEASURES:
BP-11, p. 73, BP-12, BP-13, BP-14, BP-15, #2 Test - 11A011 p. 75, R. Schultz
BP-16, Tolerancing Problems A-32 and A-33M, Jensen, BP-17, #3 Test - 11A013 p. 81
R. Schultz and p. 95 and 97 Jensen
BP-18, BP-19, BP-20, BP-21

INSTRUCTOR PRESENTATION OUTLINE:	REFERENCE NO. OF AV-CHALKBOARD DIAGRAM
I. Construction Dimensions A. Size B. Location	Filmstrip Projector McGraw Hill Filmstrips: Dimensioning, Parts I & II
II. Dimensioning of Geometric Shapes A. Cylinders B. Circles and arcs C. Angles D. Tapers, chamfers, fillets and rounds E. Internal and external threads	Transparencies - examples and chalkboard sketches
III. Dimensioning Methods A. Aligned B. Unidirectional C. Datum and baseline	Filmstrips - Parts I & II
IV. Dimensioning Methods with Shop Notes A. Holes 1. Drilling 2. Counterboring 3. Countersinking 4. Boring and reaming 5. Keys, keyways and keysets 6. Grooves 7. Knurling	Overhead Projector - Transparencies on each shop process
V. Tolerancing A. Unilateral and bilateral B. Accumulations C. Limits D. Clearances E. Interferences	Overhead Projector - Transparencies on Tolerancing

OTHER INFORMATION (Grading practices, safety, other)

Eight hours of homework outside of class.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-699-1X1 HRS/INSTRUCTION: LECTURE 6 LAB ____

COURSE TITLE: Print Reading DATE PREPARED: 6-90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit V Sections DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Interpret sectional views on prints through the understanding of the theory of cutting planes and cross hatching.
2. Read and interpret prints with the following kinds of sections: full, half, broken or partial, removed, and assembly.
3. Recognize the following conventional practices used on sectional views:
   a. conventional breaks
   b. cross hatching symbols
   c. sectioning of shafts, pins and fasteners

REFERENCES:

Active involvement sheet on Sections.

INSTRUCTOR EQUIPMENT/AV NEEDS:

Filmstrip Projector - McGraw Hill Filmstrip - Sections

STUDENT MATERIALS:

Text, pp. 112-120

LIST OF EVALUATION MEASURES:

BP-25, BP-26A, BP-26B, BP-26C

INSTRUCTOR PRESENTATION OUTLINE:	REFERENCE NO. OF AV-CHALKBOARD DIAGRAM
I. Sections A. Theory of sectioning B. Cutting planes C. Cross hatching	Filmstrip Projector McGraw Hill Filmstrip - Sections
II. Types of Sections A. Full B. Half C. Offset D. Broken out or partial E. Revolved or removed F. Assembly	Filmstrip Overhead Projector Transparencies of various sectional views
III. Conventional Sectioning Practices A. Breaks B. Cross hatching symbols C. Sectioning of standard components 1. Shaft and pins 2. Fasteners 3. Ribs, webs, and spokes 4. Aligned practices	Overhead and filmstrip

OTHER INFORMATION (Grading practices, safety, other)

Six hours of homework outside of class.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-699-1X1 HRS/INSTRUCTION: LECTURE 1 LAB 3

COURSE TITLE: Print Reading DATE PREPARED: 6-90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit VI Sketching DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Sketch horizontal, vertical, and slant lines.
2. Sketch curved lines, circles, and irregular shapes.
3. Apply dimensions to freehand sketches of multiview drawings.

REFERENCES:

INSTRUCTOR EQUIPMENT/AV NEEDS:

Overhead projector

STUDENT MATERIALS:

Text, pp. 150-171, 178-181

LIST OF EVALUATION MEASURES:

BP-31A, BP-31B, BP-32A, BP-32C, BP-33, BP-34B, BP-37A, BP-37B

INSTRUCTOR PRESENTATION OUTLINE:	REFERENCE NO. OF AV-CHALKBOARD DIAGRAM
I. Sketching A. Materials B. Techniques 1. Straight lines 2. Circles and arcs 3. Irregular shapes 4. Proportions	Chalkboard examples of all the sketching techniques.
II. Procedure for Sketching	
III. Application of Dimensions to Freehand Sketches	Overhead projector - Transparencies of putting dimensions on freehand sketches

OTHER INFORMATION (Grading practices, safety, other)

Four hours of homework outside of class.
Extra credit assignment - Read text pp. 186-189 and BP-39

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-699-1X1 HRS/INSTRUCTION: LECTURE 2 LAB 4

COURSE TITLE: Print Reading DATE PREPARED: 6-90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit VII Interpreting Drawings DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Read and interpret views of detail drawings.
2. Identify characteristics of working drawings, detail drawings, and bills of materials.
3. Interpret drawing revisions used on detail drawings.

REFERENCES:
Handouts - 4 pages on working drawings: 1-Details, 2-Assembly Drawings, 3-Bill of Materials and Parts Lists; 4-Engineering Procedure
Jensen pp. 54-56, Handouts, Jensen pp. 223-225

INSTRUCTOR EQUIPMENT/AV NEEDS:
Filmstrip Projector - Filmstrip and cassette tape - Detail and Assembly Drawings
Overhead Projector - Examples of Detail, Assembly Drawings, and Bills of Materials

STUDENT MATERIALS:
Study - Handout Test of Working Drawings

LIST OF EVALUATION MEASURES:
A-29 p. 77, Jensen; A-30 p. 87, Jensen; A-39 p.123, Jensen; Test #4 - Working Drawings Detail, Assembly and Bills of Material

INSTRUCTOR PRESENTATION OUTLINE:	REFERENCE NO. OF AV-CHALKBOARD DIAGRAM
I. Working Drawings - Follow outline on four pages of handouts	Filmstrip Projector Filmstrip and cassette tape Detail and Assembly Drawings
A. Details	
B. Assemblies	
C. Bill of Materials	
II. Drawing Revisions - p. 56, Jensen	Overhead Projector Examples of Detail and Assembly Drawings

OTHER INFORMATION (Grading practices, safety, other)

Four hours of homework outside of class.
Extra Credit - A-38M, pp. 120-121, Jensen
Students study handout of test on working drawings - answers included.
They take the same test with the questions arranged in a different order.

C6231XACO/PNDFTCOURS/S38QTXT

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline 06/30/89

COURSE TITLE	Introduction to Quality Assurance		
COURSE NUMBER	10-623-1XA	CLASSROOM PRESENTATIONS	(A) 54.00
SEMESTER HOURS	54	LAB/CLINICAL/SHOP EXPERIENCE	(B)
CREDITS	3.00	INDIVIDUAL/INDEPENDENT INSTRUCTION	(C)
CEU'S		SIMULATED/ACTUAL OCCUPATIONAL EXP	(D)
CEC'S		ON-THE-JOB EXPERIENCE	(E)

COURSE DESCRIPTION:
Quality assurance is a planned and systematic pattern of all actions necessary to provide adequate confidence that a product will conform to established requirements. This introductory course briefly examines each of the aspects of responsibility in which a quality assurance technician must be proficient. It also lays the groundwork for more in-depth study into the courses that follow, as the student progresses through the program.

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. Define quality and how it is measured.
2. Discuss some factors that should be considered when planning product quality levels.
3. Name six key departments with which quality control has primary interface.
4. Explain the relationship between design and producability, maintainability, safety and reliability.
5. Explain the three stages of product life.
6. Discuss the reasons that Japanese firms are strong competitors in the manufacturing of various products.
7. Define a quality control circle.
8. Discuss the functions of receiving inspection.
9. Give an example of a critical defect, a major defect, and a minor defect.
10. Explain the differences between inferential statistics and descriptive statistics.
11. Discuss the benefits and limitations of control charts.
12. Discuss some of the duties that a metrology ~~engineer~~ Tech might be expected to perform.
13. Explain the kinds of records that are important in liability litigation.
14. Discuss the differences between directive and non-directive approaches to leadership.

PREPARED BY: SUBMITTED BY:
COORD. APPROVAL: DATE: REVISED:
DISTRICT APPROVAL: DATE:

COURSE TITLE: Introduction to Quality Assurance
COURSE NUMBER: 10-623-1XA

COURSE OUTLINE BY UNITS:

		TYPE OF HOURS -A-	-B-
I.	Development of Quality Organizations A. Planning for product effectiveness B. Organizing to ensure product quality	6.00	
II.	Engineering a Quality Product A. Reliability and maintainability B. Productivity and quality	6.00	
III.	~~Quality Circles~~ EMPLOYEE INVOLVEMENT A. Definitions and objectives B. ~~Circle~~ TEAM organization	6.00	
IV.	The Materials Control System A. Procurement B. Source inspection C. Receiving and inspection D. Meeting government regulations	6.00	
V.	Industrial Inspection A. Statistics for quality control B. Theory and applications of control charts	6.00	
VI.	Nondestructive Testing A. Defects which can cause failures B. Methods of nondestructive testing	6.00	
VII.	Quality Costs and Implications A. Value engineering B. How costs are classified	6.00	
VIII.	Quality Costs and Implications A. Safety precautions B. Handling liability claims	6.00	
IX.	Management Concepts in Quality Assurance A. Delegation of authority B. Leadership in quality organizations C. Training employees to do quality work	6.00	
	Totals	54.00	0

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

QUALITY ASSURANCE: MANAGEMENT AND TECHNOLOGY, Gallant/Charger Publications, Inc. (distributed by American Society for Quality Control).

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XA HRS/INSTRUCTION: LECTURE ____ LAB ____

COURSE TITLE: Intro. to Quality Assurance DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Course Activities DATE REVISED: ____

[illegible]

[illegible]

1. Students could be required to read and report on one or more articles pertinent to the unit subject using the attached review sheet.

2. Tours of local industries set up for this class or in conjuction with the Mfg. Processes class to see quality functions in various industries.

3. Ask quality managers from local industries to come to class and speak on their quality departments functions or a specific area of interest to the class ie: vendor certification, new product introduction, product labeling, measuring techniques, inspection techniques etc.)

4. Have students write reports on industry tours ie: what role did quality department seem to play in the organization, what is organizations quality philosophy(do they have a mission/vision statement?), what kind of inspection equipment did they use, inspection techniques, 100% or sampling inspection, who is doing inspection, are they using spc charts, what kind of material controls, design controls, process controls do they have etc.? Students could make their own quality audit document and use it as their report format.

[illegible]

5. Acquire Quality Manuals from several industries and have students do a comparison paper on them.

[illegible]

6. Use small groups to discuss key points in various articles listed in unit lesson plans and write a consenus paper on whether they agree or disagree with article and why.

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

PERIODICAL REVIEW

Student Name _____ Date _____

Name of Periodical _____

Date of Periodical _____ Vol. _____ No. _____

Title of Article _____

_____ Pages ___ to ___

Summary of Article:

What did you find new or interesting about the article and why?

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XA HRS/INSTRUCTION: LECTURE 6 LAB ____

COURSE TITLE: Introduction to Quality Assura DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit #1 Development of Quality Organizations DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Explain the historical evolution of industry and it's impact on top managements view of the quality function.
2. Define quality terms and functions.
3. Identify the five (5) features of planning.
4. Describe effective control devices used in major functional areas.
5. Recognize how scheduling techniques affect the quality function.
6. Explain how the company's organizational structure , policies and procedures affect quality and productivity.
7. Distinguish informal communication channels from formal communication channels and their effect on quality and productivity.
8. Assess the impact of plant layout and material flow on quality and productivity.

REFERENCES: 1. In Search of Excellence by Tom Peters (12 attributes of a quality revolution)
2. Quality Assurance: Management & Technology Student text - pp.5-98.
3. Quality manual format.

INSTRUCTOR EQUIPMENT/AV NEEDS: Overhead Projector and following overheads.

Overheads: _ Cardinal Principles of Quality
_ Definition of a Customer -Total Quality Control Interface
_ Definition of Quality

STUDENT MATERIALS: 1. Article - " The Soul of an Old Machine" Fortune; May 21, 1990 pp. 66-72.
2. Article - "Manufacturing the Right Way" Fortune; May 21, 1990. pp.54-64.
3. Article - "Why Some Do It The Wrong Way" Fortune; May 21, 1990 pp.75-76.

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE

REFERENCE NO. OF
AV/CHALKBOARD DIAGRAM

Student Activity - Have students give their definition of quality.
- Complete personal quality sheets (5 sheets).

Lecture/Discussion

Industrial revolution from skilled craftsman to unskilled worker.

Definition of quality.

Discuss quality terms:
-quality control
-quality assurance
-reliability
-inspection

Five features of planning.

Controls:
-program controls
-design controls
-material controls
- process controls
- maintainability controls

Scheduling:
-Gnatt chart
-forward scheduling
-backward scheduling
-mfg. scheduling

Organizational structure
-organization chart
-company vision/mission
-dept. responsibility/authority

How communications work within company.

Problems impacting quality/productivity that arise from plant layout & material flow.

OTHER INFORMATION (Grading practices, safety, other)

2

QUALITY CONSCIOUSNESS CHECKLIST

Quality begins with awareness. You probably developed an early "quality consciousness" as a consumer. Remember how you liked the mint-green toothpaste better than the white kind? Later you made many life choices based on quality: where you lived and worked, who your friends were, what lifestyle you wanted. Consider each of the following statements and mark it true or false based on your current awareness of quality at work and in your personal life. See the authors' comments on the next page.

True/False

_____ 1. Quality is preventing problems rather than picking up the pieces afterward.

_____ 2. Quality can always be improved.

_____ 3. The KISS (Keep It Simple, Stupid!) method is the best way to insure quality.

_____ 4. The most important reason for a quality program at work is to have satisfied customers.

_____ 5. Constant attention to quality is unnecessary.

_____ 6. First impressions aren't important in creating a quality environment.

_____ 7. Quality is the little things as well as the big things.

_____ 8. A quality program must have management support to be successful.

_____ 9. Quality guidelines are best communicated by word-of-mouth.

_____ 10. Most people want to do quality work.

CHECKLIST (CONTINUED)

True/False

_____ 11. Customers pay little attention to quality.

_____ 12. A quality program must mesh with the organization's goals and profit plans.

_____ 13. Quality means conformance to standards.

_____ 14. Quality should operate in all parts of a business.

_____ 15. Personal quality standards and business quality standards have little in common.

_____ 16. Quality requires commitment.

_____ 17. Quality relates to the process as much as to the goal.

_____ 18. People who talk about quality are idealists.

ANSWERS: 1.–4. T; 5. F (Quality does not take care of itself. It takes time, energy, and creativity to maintain a successful quality program.) 6. F (The first impression may be the only chance to sell an idea, service, or product. Quality is important down to the smallest detail, and it has to be right—the first time.) 7. T, 8. T, 9. F (Quality guidelines must be issued officially from the top and they must be in writing. They should also be agreed to by employees.) 10. T, 11. F (Customers today are sophisticated and demanding, and pay as much attention to quality as to price.) 12.–14. T, 15. F (Personal and business quality standards are inseparable. People with high personal standards will be the ones to lead business quality programs.) 16.–17. T, 18. F (People who talk about quality are realists. The only way to compete successfully today is to continually improve quality.)

NOTICE YOUR PERSONAL STANDARDS

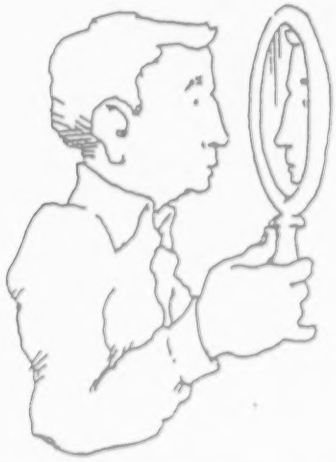
You may have noticed that some of these personal quality standards make you feel uncomfortable. You have already compared them to your own personal expectations *and* you've made a judgement call about whether they're too strict or too lenient.

If your personal standards are rather strict, you may have thought:

- Ten miles above the speed limit is illegal and I wouldn't do it.
- Exercising only twice a week isn't good enough for cardiovascular fitness.
- How could someone *think* of writing a check *before* depositing the money?
- You should never flirt!

If your personal standards do not focus on these areas, you may have thought:

- Heck, I go 20 miles above the speed limit (my radar detector helps!).
- Exercising twice a month is more than enough (you could kill yourself!).
- If a check bounces, they can send it through again...I'm not a crook!
- Romance is the spice of life! There's nothing wrong with it, even at work.



NOTICE YOUR STANDARDS

PERSONAL QUALITY STANDARDS (Continued)

See what you think of the following personal quality standards. Take a look at the subject or topic of the standard and also the *level of performance* attached to each one. Compare these standards with your own, and check whether yours are the same, higher or lower.

My standards are:

Higher	Same	Lower	
☐	☐	☐	1. Get to all appointments within *5 minutes* of the agreed time.
☐	☐	☐	2. *Never* criticize family members in front of outsiders.
☐	☐	☐	3. Stay within *10 miles* of the speed limit.
☐	☐	☐	4. *Never* speed in school zones or near children.
☐	☐	☐	5. Exercise at least *twice a week*.
☐	☐	☐	6. Wear *only* neat clean clothing outside of the house.
☐	☐	☐	7. Write checks no more than *one day* before depositing the money.
☐	☐	☐	8. Return phone calls within *one hour* of receiving the message.
☐	☐	☐	9. Flirt *occasionally* with attractive men/women in *social situations*.

IS THIS PERSONAL QUALITY? YOU DECIDE!

James drives into a clean and apparently efficient gas station to fill up. As he drives in he sees a woman pull out, so he takes the same unleaded pump she had just used.

There's no one around, so he steps over a large puddle of water and starts pumping. When the tank is half full, an attendant casually walks up and says, "Hey, bud, you better be careful, that puddle you're standing in isn't water...it's gas. The hose broke on a lady a while ago...you should've seen the gas spurting out!"

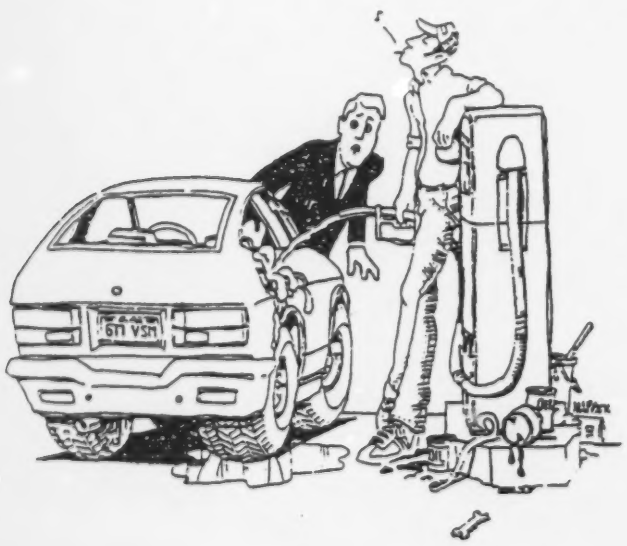
James asks, "Well, why don't you clean it up? Customers don't expect to come here and step in gasoline!" The attendant replies, "Ah, it'll evaporate. That'll be $12.50 for your fill-up, sir."

What do you think about:

This attendant's personal standards: _____

Is quality an issue here? _____

What would your standard be? _____



Quality Is Consistent Conformance To Customers' Expectations

- **Consistent**. . . means doing the job right every time
- **Conformance** . . . means to bring the product or service into agreement with customer's specifications **and** expectations
- **Customers**. . . the reason your company exists
- **Expectations**. . . a combination of written specifications and emotional needs (wants)

CARDINAL PRINCIPLES OF QUALITY

1. "Quality" is defined as exactly what the customer needs.

2. Every service or goods producing operation can be viewed as a system.

3. By the laws of random events, variation exists in the outcome of every system.

   Corollary: Less variation is better.

4. Management must change the system for quality to improve.

5. Quality and productivity are related.

6. People don't want to do a bad job.

@Leddick, Susan. Used with author's permission

WHAT IS A CUSTOMER?

A CUSTOMER is the most important person ever in this office...in person or by mail.

A CUSTOMER is not dependent on us...we are dependent on him.

A CUSTOMER is not an interruption of our work...he is the purpose of it. We are not doing him a favor by serving him...he is doing us a favor by giving us the opportunity to do so.

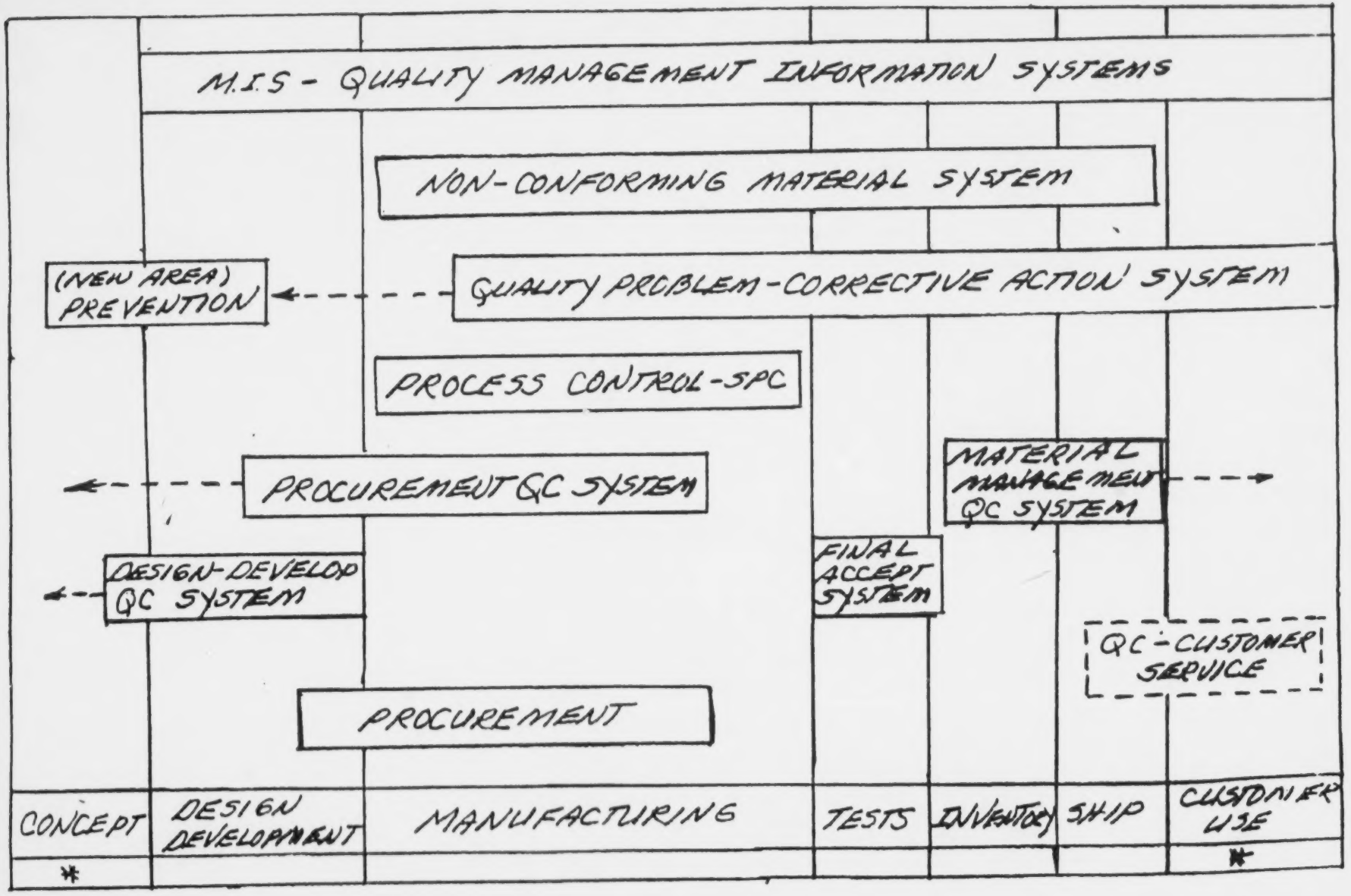
A CUSTOMER is not an outsider to our business...he is a part of it.

A CUSTOMER is not a cold statistic...he is a flesh-and-blood human being with feelings and emotions like our own, and with biases and prejudices.

A CUSTOMER is not someone to argue or match wits with. Nobody ever won an argument with a customer.

A CUSTOMER is a person who brings us his wants. It is our job to handle them profitably to him and to ourselves.

TOTAL QUALITY CONTROL - INTERFACE



PHILIP CROSBY ASSOCIATES

We will perform defect-free work for our clients and our associates. We will fully understand the requirements for our jobs and the systems that support us. We will conform to *those requirements at all times.*

After the policy has been made clear, a usable quality status report must be brought to the important meetings. Quality should be listed as a CEO agenda item in order to reaffirm its seriousness. Reports will be made on the status of:

- The quality improvement process
  - How many employees have been educated?
  - Are the teams functioning properly?
  - What success stories do we have to share?
  - What problems need action?
- The cost of quality
  - Do we have the format in all operations?
  - What are the trends?
  - Where do the biggest improvement opportunities lie?
  - What problems need action?
- Conformance
  - Are we meeting our requirements?
  - What actions do we have to take to emphasize the need to meet them?

In order to continually reaffirm dedication to the process, the CEO will have to get used to making a short speech regularly.

MANAGEMENT COMMITMENT

Support Of Philosophy

- Total Quality Management
- Meeting Customer Expectations
- Prevention of Errors

Understanding

- Investment Required
- Benefit Potential
- Long Term Payoffs

Ownership

- Part Of Business Plan
- Willingness To Participate
- Recognition Of Successes

Vision (Goals)

- Provide best total value for our customers
- Employees work in an environment of trust, co-operation and opportunity.
- Competitors consider us a role model
- Financial Performance better than competitors.

Mission (Path)

- Employees aligned to focus on customer/mkt.
- Targets - External Acceptance 98%
  On-time Delivery 80%
  Inventory Turns 10
- shorten cycle time - Target New Jobs 4wks On-Going 2wks
- more R&D
- Exceed competitors performance in such measures as productivity, cycle time, inventory turns, profitability, growth rate & mkt. share.
- continuous improvement through statistical process control, JIT mfg., product reliability, employee involvement with customers & suppliers.
- uncluttered, clean, safe atmosphere
- one company operating system.
- employee skill stretching (1 employee doing more jobs)

QUALITY MANUAL

POLICIES

Quality (Policy statement, definition of quality-oriented job responsibilities)

Engineering Change Control Policy

New Product Development Policy

Inventory Management

Quoting New Products and Revisions Policy

PRACTICES ("How To Do...")

Product specifications

Gage control

Quality control in-process

Quality control final

Quality systems audit

Customer reported discrepancies

Process capability studies

Quality assurance of supply inventory

Lot acceptance sampling plans

Record retention

Measurement capability

Designed experiments

Engineering change control

Gaining product approval

Organization and control of manufacturing documentation

Interchangeability

Drawings and specifications

Inventory control

PROCEDURES ("How To Do...")

Preliminary process capability studies

On-going process capability study

Lot control and traceability

Corrective action related to customer-reported discrepancies

Gage control

Corrective action related to internal discrepancies

In-process control

Receiving inspection

Final inspection

Initial sample inspection of product

Quality system audit procedure

Initial sample inspection for components

Measurement capability

Dock audits

Control plans

Gaining product approval procedure

Approving company policies and practices

Cancelling policy and/or practice statements

Developing and writing policy/practice/procedure

Cancelling procedures statements

Customer order revision discrepancy

Establishing visual samples

Inspection plans

Failure mode and effects analysis (FMEA)

Receiving, storing, and issuing of supply inventories

New product quotations procedure

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XA HRS/INSTRUCTION: LECTURE 6 LAB ____

COURSE TITLE: Introduction to Quality Assuran DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit #2 Engineering a Quality Product DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Associate customer satisfaction with product characteristics.
2. Recognize the importance of design on producibility (manufacturability)
3. Define reliability
4. Identify factors to be considered in designing for reliability.
5. Explain the five (5) specific ways reliability is achieved in design.
6. Illustrate periods of product failure using the bathtub curve.
7. Describe the relationship of maintainability to reliability.
8. Construct a closed loop failure reporting, failure analysis and corrective action system.
9. Distinguish between the four (4) stages of testing design & fabrication.

REFERENCES: Quality Assurance: Management & Technology - Student text pp.99-164
Article " Back to Basics " Business Week Innovation Edition, 1989 pp.14-18.
Article " Nurturing those Ideas " Business Week Innovation Edition, 1989 pp.106-
Articles "Avoiding the same old grind" &"Rain almost grounded Army's Helicopter118
INSTRUCTOR EQUIPMENT/AV NEEDS: Overhead.
Article " Robust Quality" Harvard Business Review, January-February 1990 pp.65-75
overhead - Deming's Change Reaction

STUDENT MATERIALS:

Student text - pp. 99-164

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE

REFERENCE NO. OF AV/CHALKBOARD DIAGRAM

Lecture/Discussion

Characteristics to be considered in product development.

Designing for quality:
- -drawings & specifications
- -tolerances & allowances
- -design reviews

Definition of reliability

Factors to be considered in designing for reliability:
- -cost
- -human
- -producibility

Five ways reliability is achieved in design:
- -maintainability
- -good design concepts
- -design simplification
- --design redundancy
- -derating

Bathtub curve

Maintainability:
- -relationship to reliability
- -types of maintainability
- -characteristics of maintainability

Definition of a failure

Characteristics of a closed loop failure control system

The role of testing in reliability

Introduce the concept of quality's influence on productivity.

OTHER INFORMATION (Grading practices, safety, other)

Rain almost grounded Army's Apache choppers in Panama invasion

Knight-Ridder Tribune NewsRare photo shows four Army AH-64 Apache attack helicopters flying at same time. It's rare because craft has long history of breakdowns.

MARK THOMPSON WASHINGTON BUREAU

WASHINGTON IN DEPTH

When rain threatened to ground the Army's $14 million Apache helicopters during the invasion of Panama, Army mechanics had to use kitchen ovens to dry out the choppers' sensitive electronics parts.

The Apache, supposedly an all-weather aircraft, "cannot be flown in the rain," pilots told congressional investigators earlier this month. "They told us that they definitely would not have been able to conduct the invasion if the rain had not stopped," the investigators reported.

It turns out that the Apache, the Army's newest attack helicopter, can't fly very well in any kind of weather.

Nearly half of the Apaches have problems before they take off, and once they're running, something goes wrong every 54 minutes. The Apache devours spare parts so fast it costs $5,700 an hour — nearly $100 a minute — to keep it flying, according to an Army memo. The problem gets worse as the helicopter gets older.

The Apache's woes are a legacy of the Reagan administration's $2 trillion military buildup, when the services rushed costly, complex weapons into production without ensuring their design was stable or that enough money remained to support them in the field, Pentagon officials say.

And now the Army is committed to spending $12 billion for an 800-helicopter fleet designed to fight the kind of war — against Soviet tanks — that no longer seems likely.

The Army was so concerned about Apache

BEST COPY AVAILABLE

breakdowns that its main goal at a top-level meeting last year was to "eliminate the phrase 'When it works!' from the description of Apache as the best helicopter in the world," according to a written summary of the meeting.

While the Army boasted of the Apache's performance in Panama — all seven missiles fired by Apaches hit the target, and one Apache mowed down 11 Panamanian Defense Force infantrymen from more than 1.5 miles away — the service was mum on the superhuman efforts it took to keep the ships flying.

The first two Apaches given combat missions — assigned to attack Panamanian forces at Rio Hato during the opening moments of the invasion — failed, including one crippled before takeoff by a broken hydraulic pump.

When the need for spare parts exceeded estimates, the Army began cannibalizing them from other Apaches in Panama and the United States. Eventually, the shortages got so severe the Army had to start yanking parts off the McDonnell Douglas assembly line in Mesa, Ariz., investigators found.

After only one day of combat, four of the six Apaches initially assigned to Panama had been grounded by small arms fire and breakdowns, despite round-the-clock maintenance by Army mechanics.

"Approximately one out of every two Apaches launched comes back with a maintenance problem," says a March 1989 internal Army report that only now is coming to light as part of a congressional investigation. "The Army cannot carry this type of burden."

Two of every three Apache parts fail more often than predicted, Army documents say. The Apache's $65,000 rotor blades last only 164 hours, well short of their expected 1,500-hour life.

And taxpayers aren't the only ones footing the bill for shabby parts. A failed tail rotor component "cost one aviator's life, one aircraft and paralyzed another aviator," said the March 1989 Army report.

"Pilots' perception is that these are old problems and that nothing is being done to fix them," it said, despite Army orders grounding the fleet for safety reasons at least seven times in the 44 months the Apache has been in service.

Last week, Lt. Gen. Donald Pihl told a congressional committee that the Apache's record is "unsatisfactory," but that a "tiger team" has been created to improve it. "We know we can fix" the problems, he said.

McDonnell Douglas spokesman Ken Jensen said Wednesday that maintenance problems with the aircraft have "been a major issue within this company for more than a year." But Jensen said the problems "are being resolved."

"The Army bought a Ferrari and is only willing to maintain it like a Yugo," one pilot griped to investigators. Army files are crammed with complaints about overworked Apache mechanics, although an Army official said Wednesday the service plans to boost the maintenance force by 35 percent.

The Apache's problems first came to light last year when Col. R. Dennis Kerr said he would prefer to fly the Vietnam-era Cobra gunship into combat instead of his unit's Apaches after all 12 failed during a five-day war game. Rotor blades splintered, cannons jammed, and when the cannon worked it shook so violently it shut down the Apache's electronic target finders.

Kerr's candor generated a call for an investigation by the General Accounting Office.

BEST COPY AVAILABLE

Avoiding the same old grind

Tool developed in record time

By N.R. Kleinfield
New York Times

Liberty Corner, N.J.
It began with a half-dozen "toolies" fastened on a dream.

There was the understanding that they would be set free of the "mucky-mucks."

And the inspirational spirit was a plucky man named James D. Stryker, whom colleagues call the Strykeforce, as if he were a comic-strip superhero of business.

More than two years ago, under the code name Operation Lightning, a grab-bag team in the power-tool division of Ingersoll-Rand Co. embarked on an attempt to make a new product in one-third the normal development time.

The team members brought a range of skills and temperaments, coupled with an airy disdain for conventions, to the task of creating an air grinder, a $225 flashlight-sized tool to finish and polish the pieces that become everything from bar stools to jet planes.

At the same time, they were warriors in a larger battle to learn how to compress the crippling amount of time it was taking to bring products to life.

"It was taking three years to make a tool, then three and a half and it was heading toward four," Stryker said. "Part of it was commitment, part of it was Murphy's Law. We finally said enough. Then came the blood and sweat and tears."

Operation Lightning represents one effort by one company — albeit a $3 billion machinery and equipment concern dating back to 1871, when Simon Ingersoll invented a steam-driven rock drill — but it mirrors as well a sense of urgency rippling through American business. With the advent of the global marketplace and the feverish work ethic of Pacific Rim countries, creating better products faster has become not only a wish but a necessity. Half of the nearly 400 chief executives recently surveyed by the United Research Co. cited shortening product-development cycles as their top priority.

Sitting in his office in the power-tool headquarters, Stryker, 46, stares across at a framed summation of Murphy's Law: "Anything that can go wrong, will go wrong".

In late 1987, when his boss, Richard Poore, then director of sales and marketing, asked him to figure out a way to compress the product cycle, Stryker, the head of business development, spent hours glaring at the precepts of Murphy's Law, knowing that they had much to do with why things dragged on.

He pondered the development process, best seen as a succession of walls. Marketing would think up a product and throw it over the wall separating

Toolies continued on page 3D

Continued from page 1D

it from the engineering department. Engineering would work up a design and toss it to manufacturing, which would make the product and throw it to sales. Sales would try to sell it to customers who perhaps did not want it in the first place.

Stryker urged that barriers be demolished and a team — uniting sales, marketing, engineering and manufacturing — work in unison, something not unlike the secretive "skunk works" unit created years ago by the Lockheed Corp. and imitated by others.

Convinced progress often stalls for want of a road map, Stryker devised an elaborate series of steps, expressed in connecting colored boxes on a rectangular sheet of paper, for the team to follow.

Poore "volunteered" Stryker to apply the process to making the grinder, a tool whose sales growth had been hampered by a sleepy marketplace.

"I was hoping I wasn't being another Don Quixote," Stryker said.

In late February 1988, Poore went to the tool group's main plant in Athens, Pa., and announced the intention to develop a grinder in about a year, in time for the April 1989 annual distributors' conference.

How was the deadline picked? "How did Kennedy set putting a man on the moon by the end of the decade?" Stryker said. "It just seemed like a good number."

A core team — a half-dozen people that would swell to several dozen — was patched together, led by Brian McNeill, the loquacious product manager for grinders, with Stryker as the coach.

The team bridged two universes: marketing, based in Liberty Corner in central New Jersey, and the engineers and manufacturing people in Athens, tucked in the hills on the northern border of the state.

It was not lost on the team that the project symbolized not only a chance to accomplish something profitable, but also to hoist the division's status.

For among the 25 Ingersoll-Rand divisions, the power-tool division did not draw great envy. In recent years, it seemed it might asphyxiate on its me-too products, and it was looked on as dull and trite. Members of the division were called "toolies." Toolies sold commonplace things. Toolies

BEST COPY AVAILABLE

sold cheap things.

But Toolies could dream, too, and not the least of which was to become a vital cog so that no one would again tease them.

As the team coalesced, people were squeezed into new roles, and sometimes the fit drew grunts of pain. For instance, Jim Halton, a manager in manufacturing, was told to transport his belongings to engineering to become the manufacturing contact with the team. "No, I won't," he said. "Yes, you will," his boss replied crisply.

The team crisscrossed the country to to see what customers wanted. For some members, this opened up new vistas. "In the 11 years I'd been at Ingersoll-Rand, I had never been out of the plant," Halton said. "They gave me an American Express card and business cards. Boy, it was fun."

From these excursions, it was determined, among other things, that customers coveted a more durable tool that was easy to fix, hard to stall and shaped to relieve the hand-pain afflicting many operators.

Certain distributors were interviewed, too, and although they would ultimately change their minds, at this point they thought the process was a sham.

As Tim Bradigan, a distributor in Georgia, said, "We thought once again Ingersoll-Rand was going to make something in a dark room and ram it down our throats."

A design firm hired to work up sketches thrashed out 100, winnowed the choices to 30 and then the team narrowed them to eight.

But at a June 1988 meeting to pick one to be converted into a prototype, Stryker saw that the most appealing model was a sharp departure — D-shaped and fashioned from composite material, rather than circular and metal. He felt queasy. When he said they should pick a second model in the event the preferred design backfired, tempers exploded.

"It was also looked on as a manhood issue," Stryker said. "People were telling me, 'You said you could make a decision and then you couldn't make it.' "

But two it would be.

Throughout the process, weekly team meetings were held in a special "war room," a concrete-block, windowless chamber, the walls of which swiftly became papered with engineering diagrams.

A prerequisite was that the team members feel that they had a stake in all steps. "It was always the team's project," Stryker said. "That way we avoided the 'not-invented-here' syndrome."

Significantly, top management was kept at arm's length.

To build cohesion and calm addled wits, Stryker and McNeill staged recreational outings to the horse races, a hockey game, at Stryker's home in Clinton, N.J.

But while the effort began in great fun, it quickly became spiced with dissent. No one, for instance, forgot the rumpus over the Purple Incident. In July 1988, the team met with distributors to unveil nonworking prototypes of the two models.

One was black. The more radical model was purple.

The distributors regarded it with contempt. "You must be nuts!" one distributor shrieked. Forget the color, they were told, it's just for this prototype. Still, distributors felt the company was lying and they would have to persuade customers to buy the world's most hideous grinder.

Crises gave way to schisms.

The team assembled soon after to ready a presentation for top management slated for the next day.

The matter of what material to make the grinder out of remained a sticking point. Durability was paramount, and many members felt composite was the ticket. But the engineers, among others, were dubious.

That night, the engineers took a steel tool, an aluminum tool, a competitor's metal tool and a composite prototype and looped rope around each. They fastened them to the bumper of one of the engineer's cars and dragged them around the parking lot of the motel where they were staying.

The next morning, they passed them around at the meeting. The aluminum was hopelessly dented. The metal tools were so scarred they hurt one's hand. The composite was still feeling great.

From them on, it was composite or bust. The team later subjected composites to more refined testing.

With months to go, the scramble to engineer and manufacture the grinder commenced in earnest.

"There were times that months seemed like years," McNeill said.

The nerves of many team members became jangled. Spats ensued.

Spouses of some previously chummy team members turned away in a huff when they bumped into one another at the grocery store or the cleaners.

"I got so bent out of shape at one meeting that I walked out and went home," Halton said. "I didn't return until the next week."

To conserve time, manufacturing began making parts before engineering finished the design.

Inevitably, the crunch forced compromises. To speed things up, management expanded the budget, and some suppliers were paid overtime.

Stryker felt the grinder's flange came out poorly, "But it was too late to fix it." The team also opted to ignore accessories to be sure the basic unit was done.

In November 1988, the most roisterous meeting of all took place. Six hours passed, with fingers pointed everywhere but at anyone's own chest. Finally, everyone vowed to meet the deadline, but as McNeill noted: "Nobody really believed that. But they had to say it just to get out of there."

To mollify the team, Mark Amlot, the Athens plant manager, threw a dinner party at the nearby Guthrie Inn. Spouses came, too.

Brian McNeill passed out Ingersoll-Rand gym bags with T-shirts and trinkets inside.

Around this time, McNeill and Stryker began to privately discuss contingency plans.

"One plan," Stryker said, "was to show up at the distributors' conference and make one of those shadow puppets on the wall and say, 'I know this looks like a duck, but it's really a grinder.' "

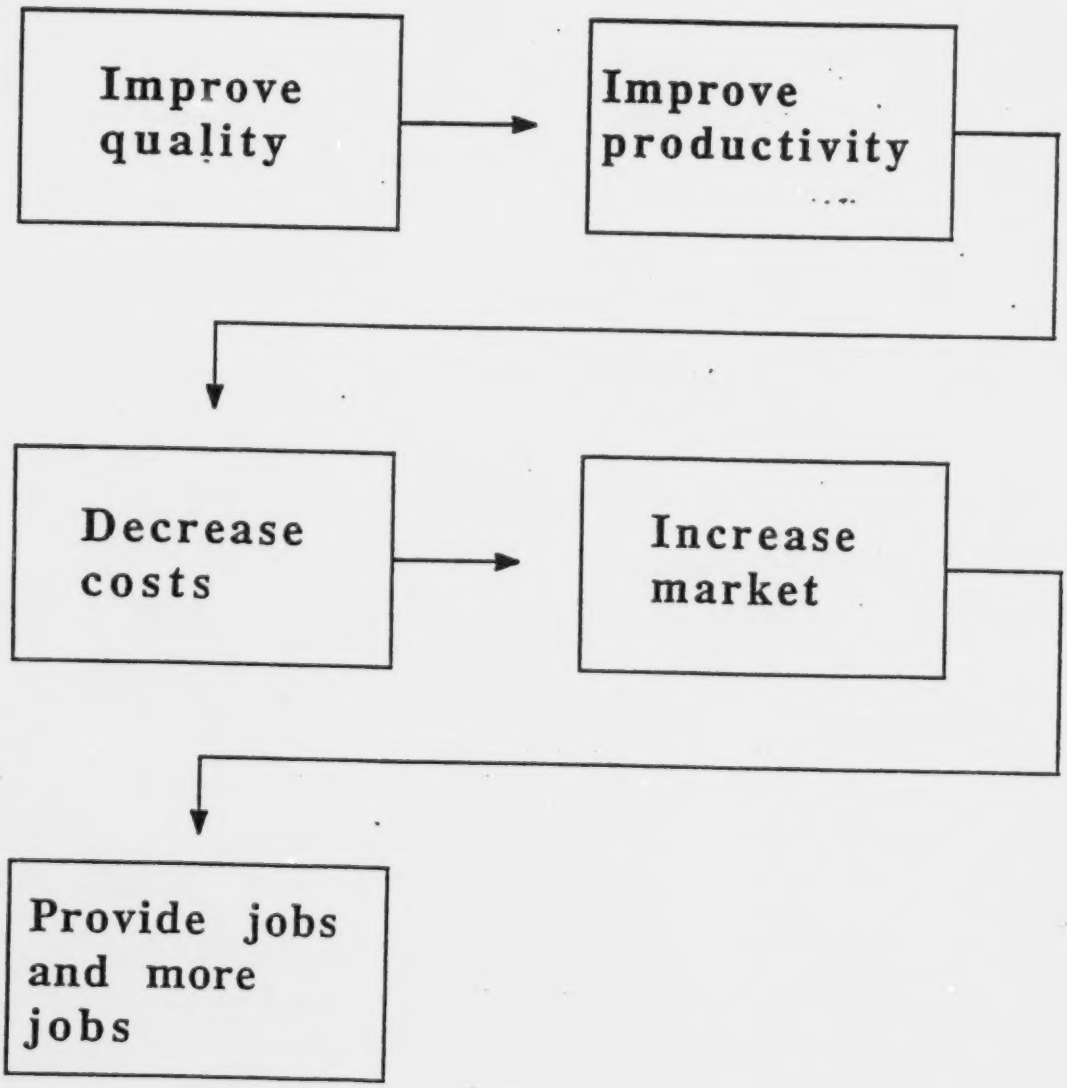
Yet, as lamps burned longer during the final push, the first grinder model, dubbed the Cyclone, came to life.

At the conference in Scottsdale, Ariz., about 25 grinders were handed out to great delight.

In June 1989 the tool was put on sale, and it has been selling briskly.

BEST COPY AVAILABLE

DEMING'S CHAIN REACTION



WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XA HRS/INSTRUCTION: LECTURE 6 LAB ____

COURSE TITLE: Intro. to Quality Assurance DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit # 3 Employee Involvement DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Differentiate between traditional work groups and teams.
2. Identify the four (4) conditions essential to successful teamwork.
3. Recognize the influence of company culture on teamwork.
4. Discuss the different types of teams and their functions.
5. Demonstrate two problem solving techniques.
6. Define employee empowerment.

REFERENCES: 1. Article - "Volvo's Radical New Plant", Business Week, Aug. 28,1989 pp. 92-93.
2. Article - "The Payoff from Teamwork", Business Week, July 10, 1989 pp.56-62.
3. Article- "Who Needs a Boss?", Fortune,May 7, 1990 pp. 52-68.
4. Article - "A Wave of Ideas, Drop by Drop", Business Week, Innovation Issue 1989, pp. 22-30.

INSTRUCTOR EQUIPMENT/AV NEEDS:
overhead projector
overhead - Groups versus Teams
overhead - 60 Excuses for a Closed Mind

STUDENT MATERIALS:

Student text pp.165 - 176
Above articles.

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE

REFERENCE NO. OF
AV/CHALKBOARD DIAGRAM

Work groups and how they are different from teams.

Define employee empowerment and why companies are utilizing the concept.

Conditions essential to successful implementation of teams in the work place.

How to define company culture and how it affects the effectiveness of teams.

Different types of teams and when you would use them:
- -cross functional teams
- - quality improvement teams
- - task teams
- - quality circles

Demonstrate fishbone and pareto charts and their use in problem solving.

Activity

Have students working in small groups construct fishbone and pareto charts to address a problem. (Ideas: How to improve the coffee., How to reduce the amount of money spent on groceries weekly.)

OTHER INFORMATION (Grading practices, safety, other)

60 EXCUSES FOR A CLOSED MIND

1. We tried that before:
2. Our place is different.
3. Cost too much.
4. That's beyond our control.
5. That's not my job.
6. We're all too busy to do that.
7. It's too radical of a change.
8. We don't have the time.
9. Not enough help.
10. That will make other equipment obsolete.
11. Let's make a market research test of it first.
12. Our plant is too small for it.
13. Not practical for operating people.
14. The people will never buy it.
15. The supervisors will scream.
16. We've never done it before.
17. It's against company policy.
18. Runs up our overhead.
19. We don't have the authority.
20. That's too ivory tower.
21. Let's get back to reality.
22. That's not our problem.
23. Why change, it's still okay.
24. I don't like the idea.
25. You're right, but...
26. You're two years ahead of time.
27. We're not ready for that.
28. We don't have the money, equipment, room, personnel...
29. It isn't in the budget.
30. Good thought, but impractical.
31. Can't teach an old dog new tricks.
32. Let's hold it in abeyance.
33. Let's give it more thought.
34. Management would never do it.
35. Let's put it in writing.
36. We'll be the laughing stock.
37. Not that again.
38. We'd lose in the long run.
39. Where did you dig that one up?
40. We did alright without it.
41. That's what to expect for staff.
42. It's never been tried.
43. Let's shelve it for now.
44. Let's form a committee
45. Has anyone else ever done it?
46. Division won't like it.
47. I don't see the connection.
48. It won't work in our plant.
49. What are you really saying?
50. Maybe that will work in your department, but not mine.
51. The Employee Involvement Committee will never do it.
52. Don't you think we should look into it before we act?
53. What do they do at our competitor's plant?
54. Let's all sleep on it.
55. It can't be done.
56. It's too much trouble to change.
57. It won't pay for itself.
58. I know a fellow who tried it.
59. It's impossible.
60. We've always done it this way.

AND THE OLD TIME FAVORITE: WE'RE NO WORSE THAN OUR COMPETITORS!

Note: Brainstorming is a difficult process - Here are some typical impediments.

GROUPS VERSUS TEAMS

Groups	Teams
- Members think they are grouped together for administrative purposes only. Individuals work independently; sometimes at cross purposes with others.	- Members recognize their interdependence and understand both personal and team goals are best accomplished with mutual support. Time is not wasted struggling over "turf" or attempting personal gain at the expense of others.
- Members tend to focus on themselves because they are not sufficiently involved in planning the unit's objectives. They approach their job simply as a hired hand.	- Members feel a sense of ownership for their jobs and unit because they are committed to goals they helped establish.
- Members are told what to do rather than being asked what the best approach would be. Suggestions are not encouraged.	- Members contribute to the organization's success by applying their unique talent and knowledge to team objectives.
- Members distrust the motives of colleagues because they do not understand the role of other members. Expressions of opinion or disagreement are considered divisive or non-supportive.	- Members work in a climate of trust and are encouraged to openly express ideas, opinions, disagreements and feelings. Questions are welcomed.
- Members are so cautious about what they say that real understanding is not possible. Game playing may occur and communications traps be set to catch the unwary.	- Members practice open and honest communication. They make an effort to understand each other's point of view.
- Members may receive good training but are limited in applying it to the job by the supervisor or other group members.	- Members are encouraged to develop skills and apply what they learn on the job. They receive the support of the team.
- Members find themselves in conflict situations which they do not know how to resolve. Their supervisor may put off intervention until serious damage is done.	- Members recognize conflict is a normal aspect of human interaction but they view such situations as an opportunity for new ideas and creativity. They work to resolve conflict quickly and constructively.
- Members may or may not participate in decisions affecting the team. Conformity often appears more important than positive results.	- Members participate in decisions affecting the team but understand their leader must make a final ruling whenever the team cannot decide, or an emergency exists. Positive results, not conformity are the goal.

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XA HRS/INSTRUCTION: LECTURE 6 LAB ____

COURSE TITLE: Intro to Quality Assurance DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit # 4 The Materials Control System DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Assess the value material management can add to a company's quality level.
2. Identify the goal of material management and classify it into functional objectives.
3. Demonstrate the role of the purchase requistion, specification and quality parameters the material control system.
4. Discuss the two aspects of supplier certification.
5. Demonstrate supplier rating methods.
6. Evaluate when to use a source inspector.
7. Determine the role of receiving and inspection in a company's material control system.

REFERENCES: 1. Student text - pp.177-197.
2. Article -"A Pursuit of Excellence", Nation's Business, January 1990 pp. 27.
3. Article - "How Velcro Got Hooked On Quality", Harvard Business Review, Sept.-Oct. 1989 pp. 34-40.

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

Student text - pp, 177-197
Above articles.

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE	REFERENCE NO. OF AV/CHALKBOARD DIAGRAM

The goal and objectives of material control.
- JIT
- appropriate quanities
- proper price
- proper quality

The role materials management plays in quality/productivity.

How purchase requistions, specifications help control material quality levels.

Some typical quality parameters used in material control.

Supplier certification
- rating methods

The role of source inspection.

The role of the receiving and inspection departments in material control.

OTHER INFORMATION (Grading practices, safety, other)

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XA HRS/INSTRUCTION: LECTURE 6 LAB ____

COURSE TITLE: Intro. to Quality Assurance DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit # 5 Industrial Inspection DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Recognize the purpose and scope of industrial inspection.
2. Discuss how SPC fits into industrial inspection.
3. Define types and degrees of nonconformances.
4. Construct a variables and attributes chart.
5. Assess when to 100% inspect and when to use acceptance sampling.
6. Discuss the use of quality audits.
7. Define statistical process control.
8. Differentiate between descriptive and inferential statistics.
9. Calculate three (3) different kinds of central location measures.
10. Calculate measures of dispersion.
11. Discuss the concept of probability and resulting distributions.
12. Illustrate unassignable /assignable causes of variation.

REFERENCES:

References: Student Text, Transformation of American Industry.

INSTRUCTOR EQUIPMENT/AV NEEDS:

Overhead projector
Overhead - 100% conformance Philosophy
Overhead - Process Control

STUDENT MATERIALS: Student text - pp. 209-293

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE

REFERENCE NO. OF AV/CHALKBOARD DIAGRAM

Purpose and scope of industrial inspection.

Types and degrees of nonconformances.

Methods of inspection.

Inspection planning.

Problems of sampling and 100% inspection.

Quality audits.

Functions of statistics.
- -inferential
- -descriptive
- -central tendency
- - dispersion

Probability concepts

Concept of variation
- -assignable
- - unassignable

Control charts and their application
- -attribute
- -variable
- -control limits

Benefits and limitations of control charts.

Activity

Inspection exercise "How good an inspector are you?"

Give students one minute to read paragraph and find all the defects (f's). Total =35 At 30 seconds remind class they only have 30 seconds left and to be sure and find all the defects. After completion remind students that inspectors do get interrupted during their inspection and what effect this might have on inspection accuracy.

OTHER INFORMATION (Grading practices, safety, other)

100% Conformance Philosophy

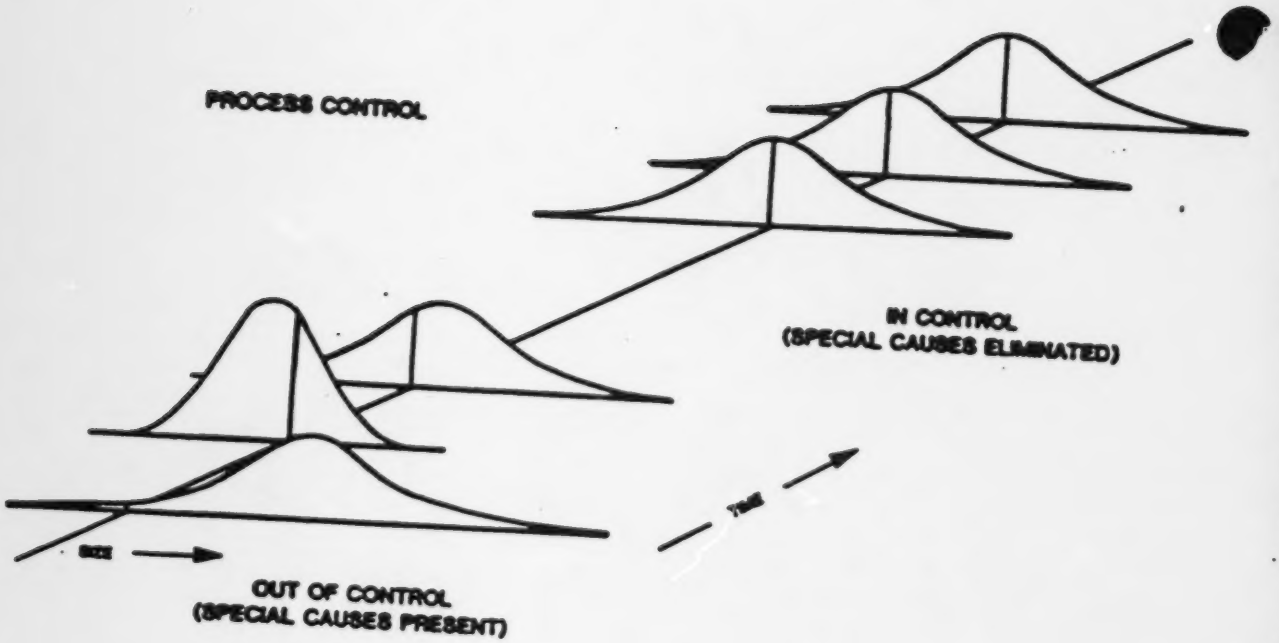
What It Is!

1. An Understanding That It Is Always Cheaper To Do It Right The First Time.
2. A Commitment That Every Job Will Be Organized And Planned With A Goal Of 100% Conformance.
3. A Recognition That The Majority Of Errors Are Caused By Management.
4. A Belief That Every Error Has A Cause Which Can Be Identified And Eliminated.
5. Planned And Measurable Improvement Towards A Goal Of 100% Conformance.

What It Is Not!

1. A Worker Motivation Program.
2. A Management Directive Aimed At Production Workers.

Project Implementation : Process Capability



REASONS FOR SAMPLING

Exercise 5-4

How Good an Inspector are You?

100% inspection is not always 100% effective. As a demonstration of the effectiveness of 100% visual inspection, you are to determine the number of f's in the following paragraph. Read through once and count the f's.

The necessity of training farm hands for first class farms in the fatherly handling of farm livestock is foremost in the minds of farm owners. Since the forefathers of the farm owners trained the farm hands for first class farms in the fatherly handling of farm livestock, the farm owners feel they should carry on with the family tradition of training farm hands of first class farms in the fatherly handling of farm livestock because they believe it is the basis of good fundamental farm management.

Total number of f's:_____

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XA HRS/INSTRUCTION: LECTURE 6 LAB ____

COURSE TITLE: Intro. to Quality Assurance DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit # 6 Nondestructive testing DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Describe the scope and purpose of nondestructive testing.
2. Identify anomolies in metals that can cause failure.
3. Classify anomolies in metals into defects and discontinuities.
4. Demonstrate an understanding of the principles of ultrasonic testing.
5. Compare the methodology of the three (3) fundamental ways in which ultrasonic principles are applied to the inspection of materials.
6. List the advantages and limitations ultrasonic inspection.
7. Describe the principlesof industrial radiography.
8. Compare the use of wet and dry particles in magnetic particle inspection.
9. Explain the advantages and limitations of pentrant inspection.
10. Evaluate the factors needed to decide what type of nondestructive test to use

REFERENCES:

Student text pp. 295-368.

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

Student text pp. 295-368

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE

REFERENCE NO. OF AV/CHALKBOARD DIAGRAM

The scope and purpose of nondestructive testing.

Define defect and discontinuity and the factors that contribute to them:
- primary processes
- secondary processes
- fatigue

Ultrasonic principles and methodology:
- three basic elements of an ultrasonic test system.
- piezoelectric effect
- pulse echo
- through transmission
- resonance
- contact method
- immersion method
- test standards

Applications of ultrasonic testing.

Limitations of ultrasonic testing.

Industrial radiography principles:
- how x-rays are produced
- properties of x-rays
- standards
- related x-ray techniques

Magnetic Particle inspecting methods:
- establishing the magnetic field
- types of current
- permeability and reluctance

Liquid penetrant inspection:
- principles of penetrant inspection
- types of penetrant inspection
- procedure of penetrant inspection
- advantages and limitations

Eddy current testing theory:
- standards
- application and limitations

~~INTRODUCTION~~ (Grading practices, safety, other)

Other nondestructive testing methods:
- microwave testing
- holographic inspection

Choosing the most suitable nondestructive test method.

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XA HRS/INSTRUCTION: LECTURE 6 LAB ____

COURSE TITLE: Intro., to Quality Assurance DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit # 7 Quality Costs and Implications DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Determine how to meet customer requirements with minimum cost.
2. Assess cost/quality objectives through value engineering.
3. Define value engineering.
4. Apply a systematic problem solving process to a specific task.
5. Distinguish between convergent and divergent thinking.
6. Describe how value analysis can benefit the whole company.
7. Classify costs according to origination and definition.
8. Evaluate quality costs according to four (4) classifications.

REFERENCES: Student text pp. 399-417
Article, "Cost Cutting: How to do it Right", Fortune, April 9, 1990.

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

Student Text pp. 399-417.

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE

REFERENCE NO. OF AV/CHALKBOARD DIAGRAM

Establishing quality level by analyzing customer needs.

Cost/quality relationship .

Value engineering's impact on cost/quality relationship.

Value engineering's systematic problem solving procedure.

How costs are classified in a company:
- direct & indirect costs
- fixed & variable costs
- methods & standards

Classifying and reporting quality costs:
- prevention
- evaluation
- pre-delivery failures
- post-delivery failures

OTHER INFORMATION (Grading practices, safety, other)

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XA HRS/INSTRUCTION: LECTURE 6 LAB ____

COURSE TITLE: Intro. to Quality Assurance DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit #8 Quality Costs and Implications DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Construct a safety policy statement.
2. Define safety terms.
3. Establish safety responsibility within organization.
4. Discuss consumerism and liability prevention.
5. Differentiate between express and implied warrenty.
6. Identify the five (5) major areas in which a manufacturer needs to take action to ensure product safety.
7. Construct questions that would need answering in a liability claim.

REFERENCES: Student Text - pp. 419-426
Article, "Getting Ahead", Design Engineering, November 1981, p. 85
Article, "The New Big Issue In Product Liability: Warnings", May/June 1987 Hazard Prevention, pp. 11-13

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

Student text pp.419-426

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE

REFERENCE NO. OF AV/CHALKBOARD DIAGRAM

Safety policy statement: purpose, objective and scope.

Safety terms definition:
- Harm
- Risk
- Hazard
- Risk of Injury
- Unreasonable Hazardous Product
- Product
- Unit

Who is responsible for safety?
- Management
- Product Safety Committee
- Chairman of Product Safety Committee

Consumerism and liability prevention.

Express and Implied warrenty.

Strict liability.

Five action areas to ensure product safety:
- Product development and design
- Manufacturing
- Information
- Marketing research
- Product liability insurance

Important factors to be investigated when addressing liability claim.

Activity

Have student prepare a safety policy statement.

OTHER INFORMATION (Grading practices, safety, other)

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XA HRS/INSTRUCTION: LECTURE 6 LAB ____

COURSE TITLE: Intro.,to Quality Assurance DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit #9 Management Concepts in Quality Assurance DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Identify the elements in the Staircase of Continous Improvement.
2. Explain the Total Quality Management.
3. Evaluate the relationship between responsibility and authority.
4. Illustrate the art of delegation.
5. Assess elements of effective leadership characteristics.
6. Evaluate the roles of: Quality Manager, Quality Personnel, First Line Supervisor and how they influence quality.
7. Compare methods of motivation.
8. Recognize the benefits of employee training.
9. Apply learning concepts to creation of new skills training plan.

REFERENCES: Student text pp.427-451
Article, "Tomorrow's Companies" The Economist, March 4, 1989.
Article, "Prize Achievements" Nation's Business, January 1990 p. 29.
Article, "This Woman has Changed Business Forever", Inc., June 1990 pp.34-47.
~~INSTRUCTOR COMMENTARY XXXX

INSTRUCTOR PRESENTATION OUTLINE

REFERENCE NO. OF AV/CHALKBOARD DIAGRAM

Elements in staircase of continuous improvement:
- an obstacle course
- a stste of turmoil
- a force in transition
- a preventive management strategy
- a team effort

Total Quality Management:
- constancy of purpose
- training
- concurrent engineering
- process improvement
- culture improvement
- employee empowerment
- waste reduction

Relationship of authority and responsibility & the art of delegation:
- Monkey,monkey who's got the monkey. (article/film)

Effecive leadership principles:
- trust your subordinates
- develop a vision
- keep your cool
- encourage risk
- be an expert
- invite dissent
- simplify

Leadership in quality organizations:
- quality manager
- quality personnel
- first line supervision
- manager-worker relationships
- industrial politics

Forms of motivation:
- job enrichment
- motivation by force
- extrinsic rewards
- intrinsic rewards
- sustained motivation

~~XXXX

From: Kennedy's Career Strategist, October, 1987.

14

Test Your Leadership Savvy

Test your understanding of organizational leadership by answering the following true/false questions.

1) Leaders always put the organization's needs ahead of the needs of one individual.

2) Leaders have courage which is one reason they have followers.

3) Leadership is inborn. You either have it or you don't.

4) Positioning oneself as a leader is part of the process of becoming a leader.

5) Leaders must have support from those they lead.

6) Leaders must be more interested in building power than getting results.

7) Men make better leaders than women because people will follow them more readily.

8) A skilled leader allows his/her followers to believe they chose their own course of action.

9) Leaders are most effective in front of group. It's important to be a persuasive public speaker.

10) A leader with strong ethics would have difficulty in most organizations. It's better to be pragmatic than principled.

11) Top management selects leaders the same way it selects managers.

12) Most people want to be leaders but they just don't have the talent.

13) People play leadership roles selectively. There is no such animal as an "all-around leader."

Here are the answers:

1) True. Would-be leaders who don't put the organization's needs first are identified as "out for themselves" or manipulative. That means they have no followers.

2) True. Without courage it's impossible to have followers. We know a secretary in the art department of a 150-person advertising firm who took command when she learned an art director had AIDS. While top management dithered about how to respond, she went to the art director and said, "This is a ▷

terrible thing. I want you to know that we will all (faint but significant emphasis on all) be here for you." The CEO dropped by later (after his secretary had reported this event) to say the same thing.

3) False. Leadership is learned. It is often a process of trial-and-error, of learning what rallies people. It also involves plumping the egos of the unworthy.

4) True. Leaders make themselves known by positioning themselves as people with a vision of what the organization can become.

5) True. Leaders must have followers. The power-hungry, on the other hand, may try to build power by threatening rather than attracting people.

6) False. Leaders only have power when they get the result. Failure is another word for powerless.

7) False. Organizational leadership is gender-blind and separate from position power. People may follow a secretary more willingly than a CEO.

8) True. A leader can point the direction and stand back, letting others assume roles in carrying out a particular task or course of action.

9) False. Most leadership is exerted behind the scenes. Leadership is going one-on-one with individuals, hearing their concerns, and persuading them to see a different view.

10) False. Every organizational leader is judged on his ethics and values. Those who don't meet group standards (generally very high) lose their followers regardless of economic or power considerations.

11) False. Leaders emerge. Top management names managers and hopes some or all will be leaders. Often it is disappointed.

12) False. Most people are willing, generally contented followers. The risks and visibility of leadership have limited appeal.

13) True. Leaders tend to emerge around an issue or crisis. No one is able to muster people for a generic cause.

Comment: The least discussed career issue, in our experience, is the misconceptions people harbor about who is and who isn't a leader. If you'll consider these points, you may have a better view of the pecking order in your workplace.□

read for

What is the problem
What can we do to correct it.

NEIL - PRODUCTION MANAGER

A MANAGER DESIRING TO INCREASE HIS EFFECTIVENESS

A TRUE STORY

At exactly 7:00 in the morning, Neil backed his car out of the driveway and started his ten mile drive to the plant. When Neil began work at the plant about fifteen years ago, he remembers clocking in at exactly 8:00. Now that he is a production manager, he arrives at 7:30 A.M. in order to get a little bit of planning time before work starts. As usual Neil tuned in his favorite radio station. As the station played music, Neil's mind began to drift as he thought about production problems and his schedule for the day.

His company is a successful one that produces quality component parts sold nationally. The company has 475 employees. The majority of the 475 employees works in one of ten production departments. 26 people report to him in his production department that produces subassemblies for the computer and electronics industry.

Neil started with the company as a regular hourly employee, but after two years he was promoted to expeditor, since he displayed an excellent understanding of the production process from beginning to end. His "people skills" were also regarded as a plus. Neil was extremely successful as an expeditor. He was promoted to foreman in his department. Neil was promoted to production supervisor several years later. Five years later he was promoted to production manager in his present department when the opening became available through retirement. His department is one of the smaller ones in terms of number of employees reporting to him, but his product line is critical to the company.

Neil was in good spirits as he relaxed behind the wheel. He thought about the various projects that he needed to complete and got psyched up as he told himself, "Today, I am really going to get things accomplished." He mentally ran through the day's work, attempting to establish priorities. He deceided he would work on the scheduling project since it was most important. Next he would consider the packaging problem. Neil then remembered that the vice-president had asked him for his thoughts on the new cost project. He then realized that he had not thought about that for several weeks.

As he drove along, he said to himself, "Gee, I haven't had much time lately to sit down and think or plan - things have been so busy. Today will be different.

He considered some of the obstacles in the production operation, and he began to break down the procedures and steps. He was sure he could drastically reduce costs with some of the new ideas he had contemplated from time to time. The ideas were not new ones, but somehow they got shelved and nothing ever came of them.

As a car honked at another ahead of him, Neil immediately thought about the inventory problem. He remembered thinking about it two months ago. He visualized the notes on his desk as he recalled his analysis of the problem, and he deceided today he would put it into effect. He then thought of a few more projects and said, "I'll deal with them right after lunch."

As Neil pulled into the parking lot and entered the plant, he could see that something was wrong. He was greeted by Carol, the production lead operator. "Good morning, Carol."

"That's what you think Neil. My overload employee is too hungover to work, and the overload place doesn't know if they can get me a replacement before the day over." Carol replied.

"Is it serious?" asked Neil.

"I don't know for sure. I just know that we must get that Acme Electronics order out today or else we are in trouble," replied Carol. "Being a person short doesn't help."

1 monkey Neil assured Carol he would take care of the problem. Rather than call Personnel, he deceided to juggle his department staff around in order to help Carol. "Just sit tight, Carol. I'll have someone for you in 45 minutes."

2 monkeys As Neil headed for his office, he was greeted by Lois, the quality control supervisor. Lois showed several finished products to Neil. "We can't possibly ship these in this conditiion, can we?" Lois then commented that half of the finished products have rough edges and aren't very acceptable. Neil said he would get in touch with Carol to see what the problem is. As he entered his office, his secretary reminded him that he was fifteen minutes late for the industrial-engineering meeting. Also, he had a message from Tina in customer service.

System imposed time

As Neil rushed to his meeting, he remembered that he didn't get a replacement for Carol. He asked his secretary to get in touch with Dave, one of the production operators, to discuss the rough-edge problem. "Ask him to meet me in my office in about an hour."

When the industrial engineering meeting had ended, Neil rushed back to his office to meet with Dave. His secretary gave him a message that his boss wanted to discuss the production reports. Neil apologized to Dave and rescheduled their meeting for after lunch. Also, he said to Dave in passing, "Tell Carol I'm working on getting her some help. Thanks!"

boss imposed time

Neil met with his boss and discovered that production was running a bit behind schedule. He told his boss he would have a meeting with his people right after lunch to determine the problem. He assured him it would be resolved immediately. When Neil returned to his office, one of the assembly workers was waiting for him to discuss the changes in the assembly operation. Neil approved the changes and made the necessary telephone calls to inform those concerned.

self-imposed

Neil asked his secretary to call all the production people and arrange to have them meet with him in the conference room at 2:00 o'clock.

Neil walked through the production area trying to find Dave. As he passed the incoming parts test station, he talked with Evey, one of the production workers. He told her she was doing a great job. Neil knew that Evey wanted to hear that since she needed frequent reassurance. Just then the lunch whistle sounded and everyone scattered for lunch. Neil returned to his office and deceided he would develop some notes for his 2:00 o'clock meeting.

As Neil began to collect his thoughts, a sales representative from the southern region called and asked him for a better delivery date on a order; Neil said he would look into it and get back to him right away. Neil then glanced down on his desk at a memo from the personnel department asking Neil to set a time for the company chemical abuse awareness program for the people in his department. He remembered that he had not returned the call to customer services this morning. He called, but Tina had left the building and was going to be tied up in a meeting all afternoon.

system imposed

Shortly after lunch Neil met with the personnel director in order to discuss some major issues that related to Neil's production people. They discussed the new performance evaluation program, the change in vacation policy, and the overtime problem exceeding his budgeted allocation in this area. Neil would need his boss to ok this budget deviation with the payroll department immediately. Neil told the personnel director he would analyze the issues and generate a report by tomorrow. Also he would discuss this matter with his boss ASAP.

Neil went to the conference room for the meeting with his production people. He mentioned the new performance evaluation program, the vacation changes, and the overtime issue. He was very participative in the meeting, honestly wanting to get sincere feedback from his people on the issues discussed. Neil said he would incorporate all their thoughts in the report he would send to the personnel director tomorrow. Neil then discussed the production schedule. He mentioned that they were "a bit behind." He asked them to think about how each of them could be more efficient in their job. He suggested they meet again tomorrow to analyze the production schedule problem further. He set the meeting for 9:00 A.M. in the training room.

self-imposed

It was after 3:30 P.M. when Neil returned to his office and remembered that he needed to investigate the delivery date for the sales representative in the southern region. He asked his secretary to gather some preliminary information so he could study the matter in the morning.

system imposed

He went to the coffee machine and purchased a cup to take back to his office. Two production managers from other departments asked him to sit with them, but Neil indicated he was to busy to take a break.

Back at his office, Neil began to collect his thoughts for the personnel report. He considered the new employee evaluation program and all its ramifications. He also remembered what his people said in the meeting. He started to write the report on his notepad. Before he knew it, it was 6:30 and he was tired. He put the ten-page handwritten memo on his secretary's desk with a note asking her to type it and send it to personnel.

Neil was ready to head home. On the way out of the plant he stopped to talk with the cleaning crew chief about housekeeping problems in the production area. After a short discussion, Neil wasn't sure if it was his people's responsibility or the cleaning crew. One more issue to address in the morning.

Mosbey 3

As he walked toward his car, his mind began to trace his day's activities. He started his car and put on the radio. As the music played, he asked himself if it was a good day. He was angered at himself as he said, "No!"

As guilt feelings began to surface, he asked himself, "Am I a production manager? I have the responsibilit and I have the authority. Yet I did not accomplish one project that I planned to. Today was typical, just like other days. I was enthusiastic on my way to work. Will tomorrow be different? Will I get closer to completion? There must be a reason! There must be an answer."

BEST COPY AVAILABLE

Neil figured the answer was night work. Of course, "I'll work on the cost project at home tonight. But where does relaxation fit in? Wow! I didn't even have lunch today."

By now Neil had reached his driveway. He slapped his forehead and remembered that he hadn't got a replacement person for Carol who met him first thig this morning. "Boy! Will she be tent out of shape tomorrow."

"I guess I don't know the answer, but everything seemed so simple this morning. I'm going to have to give Chuck a call. Well tomorrow's another day....."

Well - That's The Story

1) How to get rid of ~~mushies~~. (Short or feed)

2) Are subordinates to: recommend + take resulting action
act + advise at once
act on own (routinely report)

Subordinates must not be allowed to:
- wait until told.
- ask what to do.

Each problem leaving office at agreed upon initiative level + agreed upon time + place for next manager-subordinate conference.

never let this become vague

This procedure is a properly prepared monthly that should take only 5-15 minutes to feed

Feeding takes place by appt. only + never by mail.

MANAGEMENT TIME: WHO'S GOT THE MONKEY?

WILLIAM ONCKEN, JR. AND
DONALD L. WASS

An analogy that underscores the value of assigning, delegating, controlling.

In any organization, the manager's bosses, peers, and subordinates- in return for their active support- impose some requirements, just as he imposes upon them some of his own where many are drawing upon his support. These demands on him constitute so much of the manager's time that successful leadership hinges on his ability to control this " monkey-on-the-back" input effectively.

Mr. Oncken is chairman of the board, The William Oncken Company of Texas, Inc., a management consulting firm. Mr. Wass is president of this company.

Why is it that managers are typically running out of time while their subordinates are typically running out of work? In this article, we shall explore the meaning of management time as it relates to the interaction between the manager and his boss, his own peers, and his subordinates.

Specifically, we shall deal with three different kinds of management time:

BOSS-IMPOSED TIME- to accomplish those activities which the boss requires and which the manager cannot disregard without direct and swift penalty.

SYSTEM-IMPOSED TIME- to accommodate those requests to the manager for active support from his peers. This assistance must also be provided lest there be penalties, though not always direct or swift.

SELF-IMPOSED TIME- to do those things which the manager originates or agrees to do himself. A certain portion of this kind of time, however, will be taken by his subordinates and is called "subordinate-imposed time." The remaining portion will be his own and is called "discretionary time." Self-imposed time is not subject to penalty since neither the boss nor the system can discipline the manager for not doing what they did not know he had intended to do in the first place.

The management of time necessitates that the manager get control over the timing and content of what he does. Since what the boss and the system impose on him are backed up by penalty, he cannot tamper with those requirements. Thus his self-imposed time becomes his major area of concern.

The manager's strategy is therefore to increase the "discretionary" component of his self-imposed time by minimizing or doing away with the "subordinate" component. He will then use the added increment to get better control over his boss-imposed and system-imposed activities. Most managers spend much more subordinate-imposed time than they even faintly realize. Hence we shall use a monkey-on-the-back analogy to examine how subordinate-imposed time comes into being and what the manager can do about it.

WHERE IS THE MONKEY?

Let us imagine that a manager is walking down the hall and that he notices one of his subordinates, Mr. A, coming up the hallway. When

they are abreast of one another, Mr. A greets the manager with, "Good morning. By the way, we've got a problem. You see..." As Mr. A continues, the manager recognizes in this problem the same two characteristics common to all the problems his subordinates gratuitously bring to his attention. Namely, the manager knows (a) enough to get involved, but (b) not enough to make the on-the-spot- decision expected of him. Eventually, the manager says, "So glad you brought this up. I'm in a rush right know. Meanwhile, let me think about it and I'll let you know." Then he and Mr. A part company.

Let us analyze what has just happened. Before the two of them met, on whose back was the "monkey"? The subordinate's. After they parted, on whose back was it? The manager's. Subordinate-imposed time begins the moment a monkey successfully executes a leap from the back of a subordinate to the back of his superior and does not end until the monkey is returned to its proper owner for care and feeding.

In accepting the monkey, the manager has voluntarily assumed a position subordinate to his subordinate. That is, he has allowed Mr. A to make him his subordinate by doing two things a subordinate is generally expected to do for his boss- the manager has accepted a responsibility from his subordinate, and the manager has promised him a progress report. The subordinate, to make sure the manager does not miss this point, will later stick his head in the manager's office and cheerily query, "How's it coming?" (This is called "supervision.")

Or let us imagine again, in concluding a working conference with another subordinate, Mr. B, the manager's parting words are, "Fine. Send me a memo on that."

Let us analyze this one. The monkey is now on the subordinat's back because the next move is his, but it is poised for a leap. Watch that monkey. Mr. B dutifully writes the requested memo and drops it in his outbasket. Shortly thereafter, the manager plucks it from his inbasket and reads it. Whose move is it now? The manager's. If he does not make that move soon, he will get a follow-up memo from the subordinate (this is another form of supervision). The longer the manager delays, the more frustrated the subordinate will become (he'll be "spinning his wheels") and the more guilty the manager will feel (his backlog of subordinate-imposed-time will be mounting).

Or suppose once again that at a meeting with a third subordinate, Mr. C. the manager agrees to provide all the necessary backing for a public relations proposal he has just asked Mr. C to develop. The manager's parting words to him are, "Just let me know how I can help."

Now let us analyze this. Here the monkey is initially on the subordinate's back. But for how long? Mr. C realized that he cannot let the manager "know" until his proposal has the manager's approval. And from experience, he also realizes that his proposal will likely be sitting in the manager's briefcase for weeks waiting for him to eventually get to it. Who's really got the monkey" Who will be checking up on whom? Wheelspinning and bottlenecking are on their way again.

A fourth subordinate, Mr. D, has just been transferred from another part of the company in order to launch and eventually manage a newly created business venture. The manager has told him that they should get together

soon to hammer out a set of objectives for his new job, and that "I will draw up an initial draft for discussion with you."

Let us analyze this one, too. The subordinate has the new job (by formal assignment) and the full responsibility (by formal delegation), but the manager has the next move. Until he makes it, he will have the monkey and the subordinate will be immobilized.

Why does it all happen? Because in each instance the manager and the subordinate assume at the outset, wittingly or unwittingly, that the matter under consideration is a joint problem. The monkey in each case begins its career astride both their backs. All it has to do now is move the wrong leg, and-presto- the subordinate deftly disappears. The manager is thus left with another acquisition to his menagerie. Of course, monkeys can be trained not to move the wrong leg. But it is easier to prevent them from straddling backs in the first place.

WHO IS WORKING FOR WHOM?

To make what follows more credible, let us suppose that these same four subordinates are so thoughtful and considerate of the manager's time that they are at pains to allow no more than three monkeys to leap from each of their backs to his in any one day. In a five-day week, the manager will have picked up 60 screaming monkeys- far too many to do anything about individually. So he spends the subordinate-imposed time juggling his "priorities."

Late Friday afternoon, the manager is in his office with the door closed for privacy in order to contemplate the situation, while his subordinates are waiting outside to get a last chance before the week-end to remind him that he will have to "fish or cut bait." Imagine what they are saying to each other about the manager as they wait: "What a bottle-neck. He just can't make up his mind. How anyone ever got that high up in our company without being able to make decisions we'll never know."

Worst of all, the reason the manager cannot make any of these "next moves" is that his time is almost entirely eaten up in meeting his own boss-imposed and system-imposed requirements. To get control of these, he needs discretionary time that is in turn denied him when he is pre-occupied with all these monkeys. The manager is caught in a vicious circle.

But time is a-wasting (an understatement). The manager calls his secretary on the intercom and instructs her to tell his subordinates that he will be unavailable to see them until Monday morning. At 7:00 p.m., he drives home, intending with firm resolve to return to the office tomorrow to get caught up over the weekend. He returns bright and early the next day only to see, on the nearest green of the golf course across from his office window, a foursome. Guess who?

That does it. He now knows who is really working for whom. Moreover, he now sees that if he actually accomplishes during this weekend what he came to accomplish, his subordinates' morale will go up so sharply that they will each raise the limit on the number of monkeys they will let jump from their backs to his. In short, he now sees, with the clarity of a revelation on a mountaintop, that the more he gets caught up, the more he will fall behind.

He leaves the office with the speed of a man running away from a plague. His plan? To get caught up on something else he hasn't had time for in years: a weekend with his family. (This is one of the many varieties of discretionary time.)

Sunday night he enjoys ten hours of sweet, untroubled slumber, because he has clear-cut plans for Monday. He is going to get rid of his subordinate- imposed time. In exchange, he will get an equal amount of discretionary time, part of which he will spend with his subordinates to see that they learn the difficult but rewarding managerial are called "The Care and Feeding of Monkeys."

The manager will also have plenty of discretionary time left over for getting control of the timing and content not only of his boss-imposed time but of his system-imposed time as well. All of this may take months, but compared with the way things have been, the rewards will be enormous. His ultimate objective is to manage his management time.

GETTING RID OF THE MONKEYS

The manager returns to the office Monday morning just late enough to permit his four subordinates to collect in his outer office waiting to see him about their monkeys. He calls them in, one by one. The purpose of each interview is to take a monkey, place it on the desk between them, and figure out together how the next move might conceivably be the subordinate's. For certain monkeys, this will take some doing. The subordinate's next move may be so elusive that the manager may decide- just for now- merely to let the monkey sleep on the subordinate's back overnight and have him return with it at an appointed time the next morning to continue the joint quest for a more substantive move by the subordinate. (Monkeys sleep just as soundly overnight on subordinates' backs as on superiors'.)

As each subordinate leaves the office, the manager is rewarded by the sight of a monkey leaving his office on the subordinate's back. For the next 24 hours, the subordinate will not be waiting for the manager; instead, the manager will be waiting for the subordinate.

Later, as if to remind himself that there is no law against his engaging in a constructive exercise in the interim, the manager strolls by the subordinate's office, sticks his head in the door, and cheerily asks, "How's it coming?" (The time consumed in doing this is discretionary for the manager and boss-imposed for the subordinate.)

When the subordinate (with the monkey on his back) and the manager meet at the appointed hour the next day, the manager explains the ground rules in words to this effect:

"At no time while I am helping you with this or any other problem will your problem become my problem. The instant your problem becomes mine, you will no longer have a problem. I cannot help a man who hasn't got a problem.

"When this meeting is over, the problem will leave this office exactly the way it came in- on your back. You may ask my help at any appointed time, and we will make a joint determination of what the next move will be and which of us will make it.

"In those rare instances where the next move turns out to be mine, you and I will determine it together. I will not make any move alone."

The manager follows this same line of thought with each subordinate until at about 11:00 a.m. he realizes that he has no need to shut his door. His monkeys are gone. They will return- but by appointment only. His appointment calendar will assure this.

TRANSFERRING THE INITIATIVE

What we have been driving at in this monkey-on-the-back analogy is to transfer initiative from manager to subordinate and keep it there. We have tried to highlight a truism as obvious as it is subtle. Namely, before a manager can develop initiative in his subordinates, he must see to it that they have the initiative. Once he takes it back, they will no longer have it and he can kiss his discretionary time good-bye. It will all revert to subordinate-imposed time.

Nor can both manager and subordinate effectively have the same initiative at the same time. The opener, "Boss, we've got a problem," implies this quality and represents, as noted earlier, a monkey astride two backs, which is a very bad way to start a monkey on its career. Let us, therefore, take a few moments to examine what we prefer to call "The Anatomy of Managerial Initiative."

There are five degrees of initiative that the manager can exercise in relation to the boss and to the system: (1) WAIT until told (lowest initiative); (2) ASK what to do; (3) RECOMMEND, then take resulting action; (4) ACT, but advise at once; and (5) ACT on own, then routinely report (highest initiative).

Clearly, the manager should be professional enough not to indulge himself in initiatives 1 and 2 in relation either to the boss or to the system. A manager who uses initiative 1 has no control over either the timing or content of his boss-imposed or system-imposed time. He thereby forfeits any right to complain about what he is told to do or when he is told to do it. The manager who uses initiative 2 has control over the timing but not over the content. Initiatives 3,4, and 5 leave the manager in control of both, with the greatest control being at level 5.

The manager's job, in relation to his subordinates' initiatives, is twofold; first, to outlaw the use of initiatives 1 and 2, thus giving his subordinates no choice but to learn and master "Completed Staff Work"; then, to see that for each problem leaving his office there is an agreed-upon level of initiative assigned to it, in addition to the agreed- upon time and place of the next manager-subordinate conference. The latter should be duly noted on the manager's appointment calendar.

and the well-known processes of assigning and controlling, we shall refer briefly to the manager's appointment schedule, which calls for five hard and fast rules governing the "Care and Feeding of Monkeys" (violations of these rules will cost discretionary time.

RULE 1
Monkeys should be fed or shot. Otherwise, they will starve to death and the manager will waste valuable time on postmortems or attempted resurrections.

RULE 2
The monkey population should be kept below the maximum number the manager has time to feed. His subordinates will find time to work as many monkeys as he finds time to feed, but no more. It shouldn't take more than 5 to 15 minutes to feed a properly prepared monkey.

RULE 3
Monkeys should be fed by appointment only. The manager should not have to be hunting down starving monkeys and feeding them on a catch-as-catch-can basis.

RULE 4
Monkeys should be fed face to face or by telephone, but never by mail. (If by mail, the next move will be the manager's-remember?) Documentation may add to the feeding process, but it cannot take the place of feeding.

RULE 5
Every monkey should have an assigned "next feeding time" and "degree of initiative." These may be revised at any time by mutual consent, but never allowed to become vague or indefinite. Otherwise, the monkey will either starve to death or wind up on the manager's back.

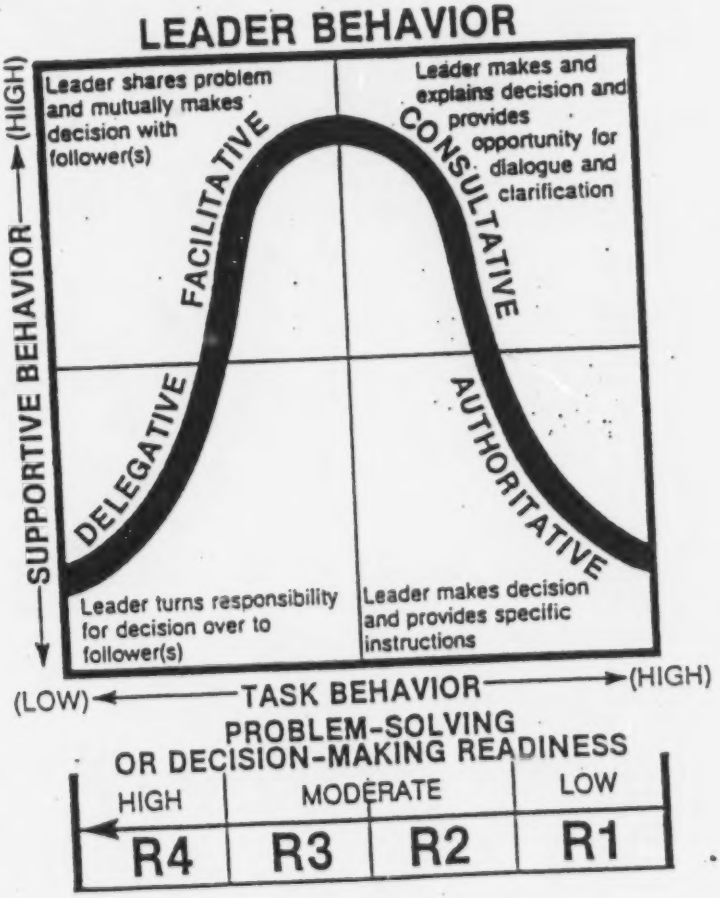
CONCLUDING NOTE

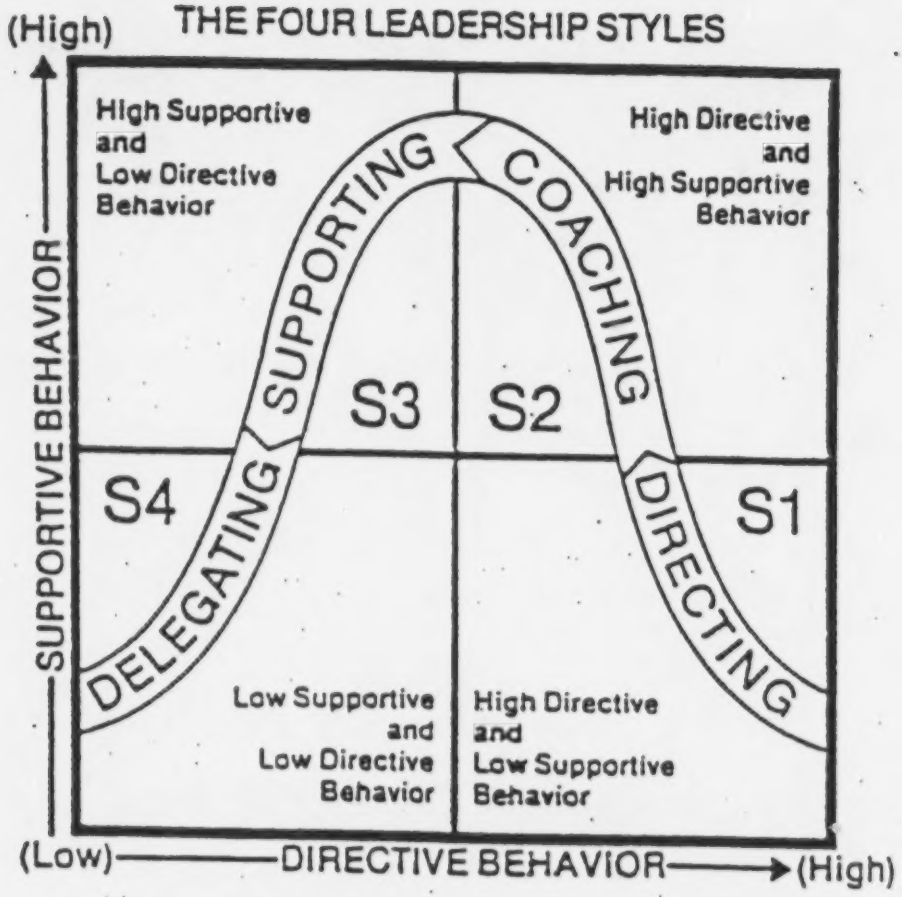
"Get control over the timing and content of what you do" is appropriate advice for managing management time. The first order of business is for the manager to enlarge his discretionary time by eliminating subordinate-imposed time. The second is for him to use a portion of his new-found discretionary time to see to it that each of his subordinates possesses the initiative without which he cannot exercise initiative, and then to see to it that this initiative is in fact taken. The third is for him to use another portion of his increased discretionary time to get and keep control of the timing and content of both boss-imposed and system-imposed time.

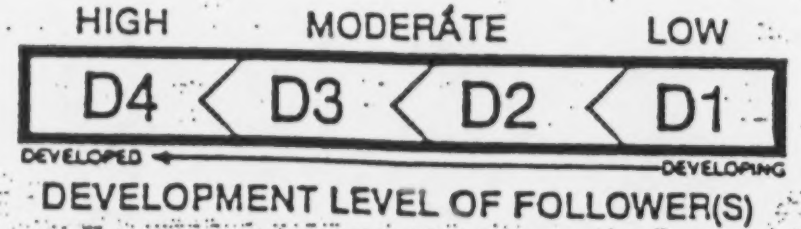
The result of all this is that the manager will increase his leverage, which will in turn enable him to multiply, without theoretical limit, the value of each hour that he spends in managing management time.

"The woods are full of them."
Quoted by Alexander Wilson, "AMERICAN ORNITHOLOG, (1808); preface

Figure 19–1 Problem-solving and decision-making styles







The SLII Leadership Model

Overlake Mining Company

FIGURE 5.4 A Training System Model

ASSESSMENT	TRAINING/DEVELOPMENT	EVALUATION
1. Assess Need	1. Select/Develop/Training	1. Pretest
2. Derive Objectives	2. Conduct/Monitor/Training	2. Evaluate Training
3. Develop Criteria		3. Evaluate Job Performance

CGRJIXECO/FNDPTCCURS/3368TAT

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline 06/30/89

COURSE TITLE	Production Processes		
COURSE NUMBER	10-623-1XE	CLASSROOM PRESENTATIONS	(A) 36.00
SEMESTER HOURS	72	LAB/CLINICAL/SHOP EXPERIENCE	(B) 36.00
CREDITS	3.00	INDIVIDUAL/INDEPENDENT INSTRUCTION	(C)
CEU'S		SIMULATED/ACTUAL OCCUPATIONAL EXP	(D)
CEC'S		ON-THE-JOB EXPERIENCE	(E)

COURSE DESCRIPTION:
This course covers specific processes used in manufacturing. These processes including casting, cold and hot rolling, forming, forging, machining, plastic molding, and joining of materials. Newer processes and methods are presented where they apply. The design, tooling and production aspect of manufacturing are also discussed. Insight is gained into the way that a manufacturing industry functions, including job titles and general responsibilities, and how production manufacturing in accomplished. (PREREQUISITES: 623-1XD Materials.)

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. Describe the process of sand casting, permanent molding and die casting.
2. Explain how molten steel is formed into industrial shapes.
3. List a number of metal cold-forming operations and explain their principles and advantages.
4. Describe the principles involved in the bonding of powders in the powder metallurgy sintering process.
5. Describe some principles and standards of measurement and explain the uses of most of the measuring instruments used in machining.
6. Understand the principles of metal removal in machining.
7. Show why cutting fluids are used.
8. Decide when to use tool room or production machinery for making a machined part.
9. State the principles and uses of abrasive machining.
10. List common non-traditional machining process and describe how these processes work.

PREPARED BY: SUBMITTED BY:
COORD. APPROVAL: DATE: REVISED:
DISTRICT APPROVAL: DATE:

COURSE TITLE: Production Processes
COURSE NUMBER: 10-623-1XE

COURSE OUTLINE BY UNITS:	TYPE OF HOURS -A-	-B-
I. Processing of Metals: Casting A. Sand casting B. Steel casting C. Die casting	2.40	2.40
II. Processing of Metals: Hot Working A. Hot rolling B. Forging processes	2.40	2.40
III. Processing of Metals: Cold Working A. Cold rolling in the steel mill B. Blanking and pressing C. Drawing, forming and extruding D. Coldforming threads and gears E. Spinning	2.40	2.40
IV. Powder Metallurgy A. Metal powders explained B. Compaction of powders C. Sintering of powder metal parts	2.40	2.40
V. Principles of Machining Processes A. Measuring systems and tools B. Principles of machining and metal removal	2.40	2.40
VI. Machine Tool Operations A. Basic machine tools B. Turning machines C. Boring, drilling and milling machines D. Abrasive machining	2.40	2.40
VII. Nontraditional Machining Processes A. Electrical discharge machining B. Laser machining C. Hydrojet machining D. Other nontraditional machining process	2.40	2.40
VIII. Joining Processes A. Mechanical fasteners B. Adhesive bonding C. Welding processes D. Plastic welding	2.40	2.40
IX. Plastics and Composites A. Plastics and composite processing methods B. Manufacturing and processing composite materials C. Tool and die making for plastic and composite processing	2.40	2.40

X.	Corrosion and Protection for Materials A. Corrosion in metals B. Protection methods	2.40	2.40
XI.	Processing Other Industrial Materials A. Glass B. Ceramics C. Wood and paper D. Fabrics E. Rubber F. Natural materials G. Construction Materials	2.40	2.40
XII.	Design, Tooling and Production Lines A. The design process B. Developing production tooling C. The modern production line and mass production	2.40	2.40
XIII.	Automation in Manufacturing A. Factors in automation B. Automation systems C. Computer-aided manufacturing D. Industrial robots	2.40	2.40
XIV.	Quality Assurance and Control A. Source and receiving inspection B. In process quality control C. Quality assurance after manufacturing	2.40	2.40
XV.	The Manufacturing Industry A. Business structure B. Preparing for production C. Production	2.40	2.40
	Totals	36.00	36.00

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

MODERN MATERIALS AND MANUFACTURING PROCESSES, Wiley.
GE MANUFACTURING MATERIALS AND PROCESSES VIDEOTAPE PROGRAMS, Genium Publishing Corp.

XVI. Heat treating

XVII. Decorating - paint, plating etc.

XVIII Packaging.

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline

COURSE TITLE	Production Processes			
COURSE NUMBER	10-623-1XE	CLASSROOM PRESENTATIONS	(A)	36.00
SEMESTER HOURS	72	LAB/CLINICAL/SHOP EXPERIENCE	(B)	36.00
CREDITS	3.00	INDIVIDUAL/INDEPENDENT INSTRUCTION	(C)	
CEU'S		SIMULATED/ACTUAL OCCUPATIONAL EXP	(D)	
CEC'S		ON-THE-JOB EXPERIENCE	(E)	

COURSE DESCRIPTION:
This course covers specific processes used in manufacturing. These processes include casting, cold and hot rolling, forming, forging, machining, plastic molding, and joining of materials. Newer processes and methods are presented where they apply. The design, tooling, and production aspects of manufacturing are also discussed. Insight is gained into the way that a manufacturing industry functions, including job titles and general responsibilities and how production manufacturing is accomplished. (PREREQUISITES: 623-1XD Materials.)

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. Describe the process of sand casting, permanent molding and die casting.
2. Explain how molten steel is formed into industrial shapes.
3. List a number of metal cold-forming operations and explain their principles and advantages.
4. Describe the principles and standards of measurement and explain the uses of most of the measuring instruments used in machining.
5. Describe some principles and standards of measurement and explain the uses of most of the measuring instruments used in machining.
6. Understand the principles of metal removal in machining.
7. Show why cutting fluids are used.
8. Decide when to use tool room or production machinery for making a machined part.
9. State the principles and uses of abrasive machining.
10. List common non-traditional machining processes and describe how these processes work.

PREPARED BY: SUBMITTED BY:
COORD. APPROVAL: DATE: REVISED:
DISTRICT APPROVAL: DATE:

COURSE TITLE: Production Processes
COURSE NUMBER: 10-623-1XE

COURSE OUTLINE BY UNITS:	TYPE OF HOURS A	B
I. Processing of Metals: Casting A. Sand casting B. Steel casting C. Die casting D. Other	2.0	4.0
II. Processing of Metals: Rolling, Forging and Powder Metallurgy A. Hot rolling B. Forging processes C. Cold rolling in the steel mill D. Blanking and pressing E. Drawing, forming and extruding F. Cold forming threads and gears G. Spinning H. Metal powders explained I. Compaction of powders J. Sintering of powder metal parts K. Other heat treating processes	5.0	5.0
III. Principles of Measurement A. Measuring systems and tools B. Principles of machining and metal removal	5.0	4.0
IV. Machine Tool Operations A. Basic machine tools B. Turning machines C. Boring, drilling and milling machines D. Abrasive machining	8.0	14.5
V. Nontraditional Machining Processes A. Electrical discharge machining B. Laser machining C. Hydrojet machining D. Other nontraditional machining processes	2.0	1.0
VI. Welding Processes A. Metal inert gas B. Tungsten inert gas C. Shield metal arc D. Other quality inspection techniques	2.0	1.0
VII. Plastics and Composites A. Plastics and composite processing methods B. Manufacturing and processing composite materials	2.0	2.5

COURSE TITLE: Production Processes
COURSE NUMBER: 10-623-1XE

		TYPE OF HOURS A	TYPE OF HOURS B
COURSE OUTLINE BY UNITS:			
VIII.	Corrosion and Protection for Materials	2.0	1.0
	A. Corrosion in metals		
	B. Protection methods		
	C. Decorating paint plating		
IX.	Automation in Manufacturing	3.0	2.0
	A. Automation systems		
	B. Computer-aided manufacturing		
	C. Industrial robots		
X.	Quality Assurance and Control	5.0	1.0
	A. Source and receiving inspection		
	B. Product specifications process sheets		
	C. In process quality control		
	D. Quality assurance after manufacturing		
	E. Business structure		
	F. Preparing for production		
	G. Production		
	H. Economics of manufacturing vs. service industries		
	I. Technology information sources		
	Totals	36.00	36.00

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

MODERN MATERIALS AND MANUFACTURING PROCESSES, Wiley
GE MANUFACTURING MATERIALS AND PROCESSES VIDEOTAPE PROGRAMS, Genium Publishing Corp.

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline

COURSE TITLE	Production Processes			
COURSE NUMBER	10-623-XXX	CLASSROOM PRESENTATIONS	(A)	36.00
SEMESTER HOURS	72	LAB/CLINICAL/SHOP EXPERIENCE	(B)	36.00
CREDITS	3.00	INDIVIDUAL/INDEPENDENT INSTRUCTION	(C)	
CEU'S		SIMULATED/ACTUAL OCCUPATIONAL EXP	(D)	
CEC'S		ON-THE-JOB EXPERIENCE	(E)	

COURSE DESCRIPTION:
This course is developed to give the student exposure to manufacturing processes and techniques used in industry. Included in the studies will be discussions of the importance of manufacturing, technology information sources, product specifications, process sheets, and how each contributes to quality.

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. Recognize the importance of manufacturing.
2. Describe product specifications.
3. Employ technology information sources.
4. Recognize the importance of planning.
5. Describe the process of sand casting, permanent mold, and die casting.
6. List a number of cold forming operations and explain their principles.
7. Describe some principles and standards of measurement and explain the uses of most measuring instruments used in machining.
8. Explain why cutting fluids are used.
9. Decide when to use tool room or production machinery for making machined parts.
10. List common non-traditional machining processes and describe how these processes work.
11. Develop an understanding of the processes related to plastics, food industry, woodworking, fabricating and the other related industries as required.

PREPARED BY: SUBMITTED BY:
COORD. APPROVAL: DATE: REVISED:
DISTRICT APPROVAL: DATE:

COURSE TITLE: Production Processes
COURSE NUMBER: 10-623-1XE

COURSE OUTLINE BY UNITS:	TYPE OF HOURS A	B
I. Processing of Metals: Casting A. Sand casting B. Steel casting C. Die casting D. Other	2.0	4.0
II. Processing of Metals: Rolling, Forging and Powder Metallurgy A. Hot rolling B. Forging processes C. Cold rolling in the steel mill D. Blanking and pressing E. Drawing, forming and extruding F. Cold forming threads and gears G. Spinning H. Metal powders explained I. Compaction of powders J. Sintering of powder metal parts K. Other heat treating processes	5.0	5.0
III. Principles of Measurement A. Measuring systems and tools B. Principles of machining and metal removal	5.0	4.0
IV. Machine Tool Operations A. Basic machine tools B. Turning machines C. Boring, drilling and milling machines D. Abrasive machining	8.0	14.5
V. Nontraditional Machining Processes A. Electrical discharge machining B. Laser machining C. Hydrojet machining D. Other nontraditional machining processes	2.0	1.0
VI. Welding Processes A. Metal inert gas B. Tungsten inert gas C. Shield metal arc D. Other quality inspection techniques	2.0	1.0
VII. Plastics and Composites A. Plastics and composite processing methods B. Manufacturing and processing composite materials	2.0	2.5

COURSE TITLE: Production Processes
COURSE NUMBER: 10-623-1XE

		TYPE OF HOURS A	TYPE OF HOURS B
COURSE OUTLINE BY UNITS:			
VIII.	Corrosion and Protection for Materials	2.0	1.0
	A. Corrosion in metals		
	B. Protection methods		
	C. Decorating paint plating		
IX.	Automation in Manufacturing	3.0	2.0
	A. Automation systems		
	B. Computer-aided manufacturing		
	C. Industrial robots		
X.	Quality Assurance and Control	5.0	1.0
	A. Source and receiving inspection		
	B. Product specifications process sheets		
	C. In process quality control		
	D. Quality assurance after manufacturing		
	E. Business structure		
	F. Preparing for production		
	G. Production		
	H. Economics of manufacturing vs. service industries		
	I. Technology information sources		
	Totals	36.00	36.00

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

MODERN MATERIALS AND MANUFACTURING PROCESSES, Wiley
GE MANUFACTURING MATERIALS AND PROCESSES VIDEOTAPE PROGRAMS, Genium Publishing Corp.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XE HRS/INSTRUCTION: LECTURE 2 LAB 4

COURSE TITLE: Production Processes DATE PREPARED: 6-90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit I Processing of Metals: Casting DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Compare and contrast: Die casting permanent mold, shell mold, and sand casting processes.
2. Identify basic casting terms.
3. Identify advantages and disadvantages of casting processes.
4. Identify basic casting defects.
5. Identify basic safety precautions relative to casting.

REFERENCES:

American Foundry Mining Society - Resource Books

INSTRUCTOR EQUIPMENT/AV NEEDS:

Film Projector
"Die Casting: How Else Would You Make It?"
Penn State University
Examples of shell mold system and others as obtainable

STUDENT MATERIALS:

Read pp. 393-441, Processes and Materials of Manufacture,
Roy A. Lindberg
Workbook 10-1 to 10-25

LIST OF EVALUATION MEASURES:

Make a casting
In 500 words, discuss:
1. The kinds of flaws in your casting
2. Other types of casting flaws and their causes
3. Problems you experienced in the making of your casting

INSTRUCTOR PRESENTATION OUTLINE: | REFERENCE NO. OF AV-CHALKBOARD DIAGRAM

CASTING PROCESSES

I. Sand Casting
   A. Green sand
   B. Oil tempered sand
   C. Pattern Parts — Transparency, Figure 10-2 Roy A. Lindberg
      1. Spree
      2. Draft
      3. Cores
      4. Runners
      5. Gates
   D. Advantages/Disadvantages

Note: One of the faster ways to get from concept to production

II. Shell Mold

III. Investment Casting — Figure 10-12
   A. Wax
   B. Very accurate

IV. Full Mold

V. Permanent Mold
   A. Die casting — Figure 10-18
   B. Hot and cold chamber — Figure 10-19

VI. Continuous casting — Figure 10-24

OTHER INFORMATION (Grading practices, safety, other)

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XE HRS/INSTRUCTION: LECTURE 5 LAB 5

COURSE TITLE: Production Processes DATE PREPARED: 6-90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit II Processing of Metals: Rolling, Forging, and Powder Metallurgy DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Identify examples of raw materials processes by:
   a. hot rolling
   b. cold rolling
   c. forging
   d. drawing
   e. extrusion
   f. spinning
   g. powdered metallurgy
2. Describe basic steps in processing the preceding techniques.
3. Identify advantages and disadvantages of the processes in objective one above.
4. Describe the basic process of heat treating.
5. Define annealing, drawing, case hardening, stress relieving, tempering, quenching, critical temperature.
6. Make hardness tests with a Rockwell hardness tester.

REFERENCES:

American Machinery Handbook

INSTRUCTOR EQUIPMENT/AV NEEDS:

Projector
Forging the Pivotal Industry
Powder Metallurgy
Extrusion - New Uses
Elements of Surface Hardening
Elements of Tempering
Elements of Hardening
Let's Talk Forging
Extrusion

STUDENT MATERIALS:

Read Units 14, 13, 12, Roy A. Lindberg

LIST OF EVALUATION MEASURES:

Units 14, 13, 12, Roy A. Lindberg

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
AV-CHALKBOARD DIAGRAM

I. Forging
   A. Processes
      1. Hammer
      2. Press
      3. Open Die
      4. Upset
      5. Extrusion
      6. Roll
      7. Precision
   B. Advantages of
   C. Disadvantages of

Drawing
High Energy Rate Form

II. Hot Rolling
   A. Material characteristics

III. Cold Rolling
   A. Material characteristics

IV. Stamping
   A. Cold forming
   B. Cold heading
   C. Dies
   D. Blanking and pressing

V. Sheet Metal Forming
   A. Tools
      1. Break
      2. Shear
      3. Drawing
      4. Spinning
      5. Roll Forming
      6. Bend Allowance
   B. Developments
      1. Parallel line
      2. Radial line
      3. Triangulation

VI. Powdered Metallurgy
   A. Metal powder production
   B. Processes of
   C. Properties of
   D. Advantages
   E. Disadvantages
   F. Typical products

VII. Heat Treating
   A. Terms
   B. Hardness testing
   C. Processes
   D. Materials

OTHER INFORMATION (Grading practices, safety, other)

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XE HRS/INSTRUCTION: LECTURE 5 LAB 4

COURSE TITLE: Production Processes DATE PREPARED: 6-90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit III Principles of Measurement DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Measure to plus or minus 1/64" with a 4 R graduated ruler
2. Measure to ± .001 using a standard micrometer
3. Measure to ± .001 using a standard Vernier caliper
4. Identify and correctly apply other standard measurement tools to measurement problems.
5. Explain the differences between the standard inch system, the metric system, and the decimal inch system of measurement.
6. Understand basic measuring terms: accuracy, precision, reliability and discrimination
7. Coordinate measuring machine

REFERENCES:

F.O.M.
Modern Metal Working by Walker Bergwall

INSTRUCTOR EQUIPMENT/AV NEEDS:

The 1" Outside Micrometer
The Vernier Caliper

STUDENT MATERIALS:

Handouts
Rule reading
Mike reading
Vernier Caliper

LIST OF EVALUATION MEASURES:

From the trade journals, find one article discussing the application of some new measuring techniques to an industrial problem.

INSTRUCTOR PRESENTATION OUTLINE:	REFERENCE NO. OF AV-CHALKBOARD DIAGRAM
I. Review Rule Reading	Handout
II. Mike Reading - Video	Handout
III. Vernier Caliper - Video	Handout
IV. Gage Blocks - Video	
V. Height Gage	
VI. Coordinate Measuring Machine	
VII. Other	

OTHER INFORMATION (Grading practices, safety, other)

Measure your machined part on CMM and obtain printout.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XE HRS/INSTRUCTION: LECTURE 8 LAB 14.5

COURSE TITLE: Production Processes DATE PREPARED: _____

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit IV Machine Tool Operations DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Identify and correctly use basic hand tools.
2. Make basic set ups with a tool room lathe.
3. Turn straight diameters to ± .001 and lengths to ± 1/64.
4. Make basic set ups in a vertical milling machine, milling a flat surface to ± .003.
5. Select the proper drill and tap and make the basic set up to drill and tap a hole.
6. Identify basic factors involved in metal cutting theory and how each contributes to quality.

REFERENCES:

Machinery Handbook

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

Processes and Materials of Manufacture, Units 5, 6, 7, 8, 9

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF AV-CHALKBOARD DIAGRAM

I. Lathe Safety

II. Lathe
- A. Feeds and speed - surface finish
- B. Cutting threads
- C. Types of chucks
- D. Lathe operations - drilling, boring, turning, knurling
- E. Types of

III. Drill Press Safety

IV. Drill Press
- A. Types
- B. Sizing
- C. Tap drill selection
- D. Accuracy
- E. Reaming
- F. Tapping

V. Milling Safety

VI. Milling
- A. Types
- B. Basic cutter types
- C. Fixtures
- D. CNC

VII. Tool Types and Tool Wear

VIII. Cutting Fluids - Effect on Finish and Tool Life

IX. Grinding
- A. Operations

X. CAD/CAM

OTHER INFORMATION (Grading practices, safety, other)

From the processes discussed in this unit, find an article in a trade journal that discusses a new application of the technique or the effect of the applications of the process on quality and productivity.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XE HRS/INSTRUCTION: LECTURE 2 LAB 1

COURSE TITLE: Production Processes DATE PREPARED: 6-90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit V Nontraditional Machining Processes DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. List and describe in basic terms the four main groups of non-traditional machining processes.
2. List basic principles of operation of chemical milling.
3. List three applications of the chemical milling process.
4. List several advantages and disadvantages of chemical milling.
5. Discuss the principles and operations of photochemical milling.
6. List several advantages and disadvantages of photo chemical milling.
7. Describe the basic principles of operations of electrical-discharge machining.
8. Describe typical applications of E.D.M.
9. Describe the basic differences between E.D.M. and wire E.D.M.
10. Identify typical applications for wire E.D.M.
11. Describe the basic principles of operation for electrochemical machining.
12. Identify several advantages and disadvantages of electrochemical machining.
13. Identify typical applications for electrochemical machining.
14. Identify the principles of operation of water jet cutting.
15. Identify typical applications of water jet cutting.
16. Discuss the advantages and disadvantages of water jet cutting.

REFERENCES:

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Read Unit 18, Processes and Materials of Manufacture

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF AV-CHALKBOARD DIAGRAM

I. Chemical Milling
A process of metal removal in which the parts are shaped or dup-etched to close tolerances by immersion in a controlled chemical etch solution. Metal may be uniformly removed from the entire surface or from selected areas of irregularly shaped parts such as castings, forgings, or extrusions.

A. Principles of Operation
1. Cleaning
2. Masking
3. Scribing
4. Chemical etching
5. Removal of mask

B. Application
C. Advantages
D. Disadvantages

II. P.C.M. - Photo Chemical Milling
A. Principles of Operation
Masks are applied by photographic methods from masters that are normally made oversize. Then photographically reduced to actual size. The photo sensitive coating acts as a mask for the etching process.
B. Applications
Used for very thin metal films
C. Advantages
D. Disadvantages

III. Electrical Discharge Machining
A. Principles of Operation
A spark arcs from an electrode to the part causing an erosion of the part. The arc can cause temperatures as high as 10,000 degrees and pressures thousands of times greater than atmospheric pressure. A coolant or dielectric surrounds the electrode and works to wash away tiny metal particles.
1. Electrodes
Copper, graphite, copper tungsten, brass

B. Applications
1. Die work
2. Molds for plastic

C. Advantages
D. Disadvantages

IV. Wire E.D.M.
A. Principles of Operation
The electrode is a wire that travels through the work piece from a feed reel to a take up reel. The process is otherwise similar to E.D.M.
B. Advantages
C. Disadvantages

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF AV-CHALKBOARD DIAGRAM

V. Electrochemical Machining E.C.M.
   A. Principles of Operation
      A machining process that may be described as the reverse of electroplating. The electrochemical reaction depletes the metal of the work piece.
   B. Advantages
   C. Disadvantages
   D. Typical Applications

VI. Water Jet Cutting
   A. Principles of Operation
      Water or water and abrasive mixtures of water shaped into a coherent stream fired at 3400 fps into a material resulting in a clean smooth cut.
   B. Applications
      Ferrous and nonferrous materials
   C. Advantages
   D. Disadvantages

OTHER INFORMATION (Grading practices, safety, other)

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XE HRS/INSTRUCTION: LECTURE 2 LAB 1

COURSE TITLE: Production Processes DATE PREPARED: 6-90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit VI Welding Processes DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Identify typical welding processes: SMAW, GMAW, GTAW, FCAW.
2. Describe basic factors that contribute to poor weld quality.
3. Describe basic methods of non-destructive testing of weld quality.
4. Describe basic methods of destructive testing weld quality.
5. Describe basic advantages and disadvantages of the four processes in competency number one above.
6. Identify typical applications for SMAW, GMAW, GTAW, FCAW.

REFERENCES:

Modern Welding
Welding Journal, American Welding Society

INSTRUCTOR EQUIPMENT/AV NEEDS:

Projector
"Ways to Weld"

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Read Unit 15, Roy A. Lindberg

Option 1. Select one of the weld inspections techniques discussed in class. From a welding journal or other source, locate an article on the inspection technique and write a 350 word summary of the article using the summary form from your instructor.

Option 2. Find a weld inspection technique not discussed in class and write a 200 word summary of the technique on the report summary sheet from your instructor.

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF AV-CHALKBOARD DIAGRAM

I. Weld Quality
   - A. Grain control
   - B. Hardness control
   - C. Service weldability
   - D. Fabrication weldability
   - E. Melting point
   - F. Thermal conductivity
   - G. Electrical resistance
   - H. Surface conditions
   - I. Hot cracks
   - J. Cold cracks
   - K. Pre-heat
   - L. Post-heat

Non-destructive weld testing techniques

II. Arc Weld - SMAW
   - A. Power supply
   - B. AC DCSP DCRP
   - C. Shielding and flux coatings
   - D. Advantages
   - E. Disadvantages

Applications of

III. Gas Tungsten Arc Welding (GTAW)
   - A. Power supply
   - B. Electrode
   - C. Materials best suited to this process
   - D. Advantages
   - E. Disadvantages
   - F. Shielding gas

Applications of

IV. Gas Metal Arc Welding (GMAW)
   - A. Power supply and equipment differences
   - B. Shield gas
   - C. Wire feed system
   - D. Dip transfer
   - E. Spray transfer
   - F. Advantages
   - G. Disadvantages
   - H. Applications of

V. Flux Cored Arc Welding (FCAW)
   - A. Equipment
   - B. Rod differences
   - C. Applications of
   - D. Advantages
   - E. Disadvantages

VI. Other Processes

OTHER INFORMATION (Grading practices, safety, other)

Option 1. Tour weld shop demonstrations of processes and robot.

Option 2. Tour local industry in fab area.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XE HRS/INSTRUCTION: LECTURE 2 LAB 2.5

COURSE TITLE: Production Processes DATE PREPARED: 6-90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit VII Plastics and Composites DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Identify the basic differences between thermo setting and thermo plastic polymers.
2. Identify basic characteristics that distinguish each of the following processes:
   a. Plastic casting
   b. Compression molding
   c. Injection molding
   d. Extrusion
   e. Blow molding
   f. Thermo forming
   g. Reinforced plastic molding
3. List two advantages and disadvantages for the preceding processes.
4. Identify typical secondary operations performed on plastic parts.
5. Define plastic.
6. In basic terms describe what is occurring during polymerization.

REFERENCES:

Modern Plastic Encyclopedia

INSTRUCTOR EQUIPMENT/AV NEEDS:

Video - Solids Modeling

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Read Unit 11, Roy A. Lindberg

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF AV-CHALKBOARD DIAGRAM

Figures 11-1 and 11-4, Roy A. Lindberg

I. Definitions
   A. Plastic - Proper Term - Polymer
      A high molecular weight compound, natural or synthetic, whose structure can usually be represented by a repeated small unit.
   B. Polymerization - Curing
      A chemical reaction in which the high molecular weight molecules are formed from the original substances.
   C. Thermo Plastic - Heat Flowable - Linear Polymer Chain
   D. Thermo Set - Heat Set or Chemical Set, Cross-linked Polymer Chain

II. Processing Techniques
   A. Casting
      1. Typical parts
      2. Accuracy
      3. Advantages
      4. Types of polymers used
   B. Compression molding
      1. Typical parts
      2. Advantages
   C. Injection molding
      1. Greatest number of parts fabricated by this process
      2. Typical parts
      3. Advantages of
      4. Accuracy of
   D. Roto molding
      1. Typical parts
      2. Advantages and limitations of
   E. Extrusion
      1. Advantages
      2. Typical products
   F. Blow Molding
      1. Advantages
      2. Typical products
   G. Thermo forming
      1. Types of products
      2. Steps of process
   H. Reinforced plastic molding
      1.Advantages
      2. Disadvantages
      3. Types of products
   I. Bonding techniques
      1. Fusion
      2. Solvent
      3. Friction welding
      4. Induction welding
   J. Machining
      1. Traditional
      2. Nontraditional
   K. Plating
   L. Plastics as an adhesive bonding agent.
      1. Structural
      2. Nonstructural
      3. Types
      4. Applications of

OTHER INFORMATION (Grading practices, safety, other)

Trip to AMOCO Foam, Chippewa Falls

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XE HRS/INSTRUCTION: LECTURE 2 LAB 1

COURSE TITLE: Production Processes DATE PREPARED: 6-90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

VIII Corrosion and Protection for Materials DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Identify basic causes of corrosion.
2. Identify basic types of corrosion.
3. List several basic solutions to minimize corrosion problems.

REFERENCES:

Aircraft Hardware Standards Manual and Engineering References by Stanley J. Dzik
Stits Aircraft Recovering Manual, Dupont

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF AV-CHALKBOARD DIAGRAM

I. Types of Corrosion
   A. Atmospheric
   B. Galvanic
   C. Pitting
   D. Concentration Cell Corrosion
   E. Intergranular
   F. Stress
   G. Corrosion fatigue
   H. Stray currents

II. Minimization
   A. Material selection
   B. Coatings
   C. Painting
   D. Plating
   E. Other

OTHER INFORMATION (Grading practices, safety, other)

Option 1. Trip to Wright Products to view painting, plating, rolling mill.

Option 2. Trip to Horton Manufacturing to view plating and machine shop.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XE HRS/INSTRUCTION: LECTURE 3 LAB 2

COURSE TITLE: Production Processes DATE PREPARED: 6-90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit IX Automation in Manufacturing DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Define NC and CNC and explain the basic differences between the two processes.
2. Describe in basic terms closed loop, open loop, and adaptive control systems.
3. Define point to point and continuous path systems and identify tool movements typical of each system.
4. Identify data input mediums.
5. Explain the purpose of a post processor.
6. Define canned cycles.
7. Identify computer memory types and information stored relative to each.
8. Explain the difference between hardware and software.
9. Explain the basic difference between CNC, machining centers, and robots.
10. List basic advantages and disadvantages of CNC machining centers.
11. Identify X, Y, and Z axis on miller.

REFERENCES:

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Read Unit 3, Roy A. Lindberg

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF AV-CHALKBOARD DIAGRAM

I. Automation
   A. NC
   B. CNC
   C. Closed loop
   D. Open loop
   E. Adaptive control

II. Cartesian Coordinates
   A. X, Y, Z milling machines
   B. Lathes

III. Positioning
   A. Point to point
   B. Continuous path

IV. Data Input
   A. Mag tape
   B. Keyboard
   C. Digitizers
   D. Canned cycles
   E. Post processors
   F. Memory

CAD/CAM Software

V. Machining Centers

VI. Robotics
   A. Advantages
   B. Disadvantages

OTHER INFORMATION (Grading practices, safety, other)

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XE HRS/INSTRUCTION: LECTURE 5 LAB 1

COURSE TITLE: Production Processes DATE PREPARED: 6-90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit X Quality Assurance and Control DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Identify departments responsible for establishing part specifications.
2. Identify components of quality based on evaluation of purchase orders for parts in the receiving department.
3. Identify the responsibilities of quality assurance in production.
4. Identify the responsibilities of quality assurance after manufacturing.
5. Identify basic components of quality based on evolution of process sheets.
6. Identify basic components of quality based on evolution of prints.
7. Identify extra duties after given to quality assurance.
8. Identify structure of large business.
9. Describe structure of a typical family business.
10. Describe steps in process from product concept to final production.
11. Identify the economic impact of manufacturing vs. service industries on a local economy.
12. Identify sources of technological information.
13. Define data base as it relates to manufacturing.

REFERENCES:

Inspection and Gaging - Kennedy, Hoffman, Bond

INSTRUCTOR EQUIPMENT/AV NEEDS:

Video - Leadership - Tom Peters

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Unit 19, Roy A. Lindberg
Unit 4, pp. 171-183

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
AV-CHALKBOARD DIAGRAM

I. Process Sheets
   A. Part requirements
   B. Sequence of operations
   C. Equipment
   D. Process times
   E. Process plan or documentation
      1. Part I.D.
      2. Processing steps
      3. Set up and cycle times
      4. Tooling
      5. Production control information
II. Flow Charts
III. Functions of Quality Assurance Department
   A. Process inspection
   B. Batch inspection
   C. Final inspection
   D. Receiving
   E. Tool and gage inspection
   F. Causes of problems
   G. General shop conditions
      1. Maintenance of machines
      2. Lighting
      3. Housekeeping
      4. Design salvage plans
   H. Education
   I. Communications
IV. Sources of Specifications
   A. Blueprints
   B. Process/operation sheets
   C. Material specifications
   D. Written specifications
   E. Purchase orders
   F. Other types of specifications
   G. Role of engineering, management and sales in establishing specifications
V. Business Structures
   A. Corporate
   B. Economic
   C. Family owned
VI. Economic Impact of Manufacturing vs. Economic Impact of Service Industries
VII. Source of Technological Information
   A. Periodicals
   B. Societies
VIII. Manufacturing Data Bases
   A. Contents of
   B. Uses of

OTHER INFORMATION (Grading practices, safety, other)

Co231X100/PNDFTCOURS/S38QTXT

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline 06/30/89

COURSE TITLE	Product & System Quality Auditing			
COURSE NUMBER	10-623-1XI	CLASSROOM PRESENTATIONS	(A)	3.00
SEMESTER HOURS	54	LAB/CLINICAL/SHOP EXPERIENCE	(B)	
CREDITS	3.00	INDIVIDUAL/INDEPENDENT INSTRUCTION	(C)	
CEU'S		SIMULATED/ACTUAL OCCUPATIONAL EXP	(D)	
CEC'S		ON-THE-JOB EXPERIENCE	(E)	

COURSE DESCRIPTION:
This course presents experiences in auditing product and system quality. It presents generic guidelines for the auditing of quality control systems. Information and practical problems in establishing goals, specifying requirements and characteristics of the audit, organizing and conducting the audit, and the evaluation and utilization of the results of the audit will be presented. (PREREQUISITES: 804-XXX Basic Statistics or equivalent.)

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. Describe the goals of an audit program.
2. List four different circumstances or conditions that would be justification for conducting an audit.
3. Describe the process of determining the frequency of an audit.
4. Enumerate on the selection of audit criteria.
5. State the areas of technical expertise needed by the audit team.
6. Outline the task involved in conducting the audit.
7. Discuss the responsibilities of the auditing team in completion of the audit, post audit, and follow-up tasks.

PREPARED BY: SUBMITTED BY:
COORD. APPROVAL: DATE: REVISED:
DISTRICT APPROVAL: DATE:

COURSE TITLE: Product & System Quality Auditing
COURSE NUMBER: 10-623-1XI

COURSE OUTLINE BY UNITS:		TYPE OF HOURS -A-	-B-
I.	Authority for the Audit	6.00	
II.	When to Conduct the Audit	4.00	
III.	Purpose of the Audit	4.00	
IV.	Establishment of Audit Frequency	4.00	
V.	Audit Criteria	6.00	
VI.	Technical Expertise Needed by the Audit Team	6.00	
VII.	Conducting the Audit	6.00	
VIII.	Practical Auditing Projects	6.00	
IX.	Critique of Auditing Projects	6.00	
X.	Audit Reporting Writing	6.00	
XI	Follow-up.		
	Totals	54.00	0

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

HOW TO PLAN AN AUDIT, ASQC Quality Audit Technical Committee
AUDITING STANDARDS: A COMPARATIVE ANALYSIS, Walter Willborn, American Society for Quality Control.

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XI HRS/INSTRUCTION: LECTURE 6 LAB ____

COURSE TITLE: Product & System Quality Auditing DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit #1 Authority for the audit DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Define audit.
2. Identify types of audits.
3. Assess the sources of authority.

REFERENCES: 1. Student text - Audit Standards, A Comparative Analysis by Walter Willborn, pp. 3-6.
2. How To Plan An Audit by ASQC Quality Audit Technical Committee, pp.2-4
3. The Quality Audit - A Management Tool by Charles A. Mills.
4. Quality Audits For Improved Performance by Dennis R. Arter.

STUDENT MATERIALS:

Student texts - pages as noted above.

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE

REFERENCE NO. OF
AV/CHALKBOARD DIAGRAM

1. Define audit:
   - per International Organization for Standardization (ISO).
   - what it is not
   - why do it
   - who is involved
   - when to perform one
   - definitions of Quality Audit and associated terms from International & National Standards.

2. Types of audits:
   - external
     - quality system certification/registration
     - vendor appraisal
     - product liability insurance
     - regulatory controls
     - corporate quality audits
     - product certification
     - process certification
   - internal
     - system audits
     - mgt. review
     - performance reviews
     - product reviews
     - process reviews
     - service reviews
     - data processing
     - customer service

3. Sources of authority:
   - CEO
   - management
   - contract
   - specification
   - policy
   - government regulations
   - customers

OTHER INFORMATION (Grading practices, safety, other)

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XI HRS/INSTRUCTION: LECTURE 4 LAB ____

COURSE TITLE: Product & System Quality Auditing DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit #2 When to conduct the audit DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Assess appropriate times for conducting an audit to meet stated goals.
2. Describe criteria used for determining when to conduct an audit.
3. List five (5) typical audits based on company goals.
4. Compare methods of establishing audit frequency.

REFERENCES: Student text - Audit Standards-A Comparative Analysis pp. 28.
Student text - How to Plan an Audit - pp. 5-6, 11-13.
The Quality Audit - A Management Tool

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

Student texts as specified above.

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE

REFERENCE NO. OF
AV/CHALKBOARD DIAGRAM

1. Goals and scope of audit determine appropriate time to conduct audit:
   - identify deficiencies
   - verification of standards
   - verification of efficiency of methods
   - verification of total system
   - verification of part of a system
   - verification of personnel
   - verification of facilities

2. Criteria for when to conduct audit:
   - as early in life of activity as practical
   - provide coverage and coordination with ongoing quality assurance activitie
   - need for information
   - cost of product

3. Iniating audits: (frequency)
   - once or twice a year
   - various types of audits spread out over 6 mos./1 yr.
   - random audits unannounced
   - random audits at staggered times

4. Five types of typical audits based on company goals:
   - design audit (early verification or detection of deficiencies)
   - preproduction audit (review measurement & test equipment, process capabilities, calibrations system, tool & fixture maintenance required for new product production)
   - production audit (verify above systems still effective)
   - usage audit (monitors customers acceptance or areas of concern with product)

OTHER INFORMATION (Grading practices, safety, other)

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XI HRS/INSTRUCTION: LECTURE 4 LAB ____

COURSE TITLE: Product & System Quality Auditing DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit #3 Purpose of audit. DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Analyze importance of audit goal/objective to the successful completion of audit.
2. List typical audit goals/objectives of companies.
3. Demonstrate techniques of system analysis necessary to establish clear audit goals/objectives.
4. Write audit goal/objective and scope statements.

REFERENCES:
1. How to Plan an Audit pp.7-10.
2. The Quality Audit as a Management Tool
3. Quality Audits for Improved Performance

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

Student text as denoted above.

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE

REFERENCE NO. OF AV/CHALKBOARD DIAGRAM

1. Audit goals/objectives:
   - clearly expressed in terms of why, what, who & how.
   - concensus on goals/objectives by client, auditee & auditor.
   - defuse human reaction of defensiveness.

2. Scope defined in terms of:
   - areas & objects to be audited (broad brush, total system, part of system).
   - standards to be used

3. Typical audit goals/objectives:
   - internal quality system verification
   - supplier quality system verification
   - contractual requirements
   - special concerns
   - product or service integrity verification
   - opportunities for improvement
   - improvement of return on investment
   - process verification

4. Methods of system analysis to establish clear goals/objectives:
   - function tree
   - decision flow chart
   - critical path network (PERT)
   - matrix responsibility chart
   - cause & effect diagram

Activities:

1. Students construct and apply results to writing a goal/objective and scope statement:
   -function tree
   -decision flow chart
   -critical path network
   -matrix responsibility chart
   -cause & effect diagram

OTHER INFORMATION (Grading practices, safety, other)

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XI HRS/INSTRUCTION: LECTURE 4 LAB ____

COURSE TITLE: Product & System Quality Auditing DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit #4 Establishment of Audit Frequency DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Identify basis of establishing audit frequency.
2. Differentiate between five (5) basic audit frequencies.

REFERENCES: 1. How to Plan Audit, pp.11-13

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

Student text as denoted above.

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE

REFERENCE NO. OF
AV/CHALKBOARD DIAGRAM

1. Basis for audit frequency:
   - law/regulation
   - audit program policy
   - professional standards
   - contract requirements

2. Basic audit frequencies based on goals/objectives:
   - Initial audit
     Goal - identify strengths & weaknesses of new suppliers, processes or products.
   - Periodic audit
     Goal - verifies system is performing to requirements.
   - Continuous audit
     Goal - process control
   - Unscheduled audit
     Goal - uncover intentional unethical or illegal practices.
   - Follow-up audit
     Goal - verify agreed upon corrective action.

OTHER INFORMATION (Grading practices, safety, other)

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XI HRS/INSTRUCTION: LECTURE 6 LAB ____

COURSE TITLE: Product & System Quality Auditing DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit #5 Audit Criteria DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Describe the criteria for which the client, auditee & auditor are responsible.
2. Construct an audit checklist.

REFERENCES:
1. How to Plan an Audit , pp.14-17.
2. International Standardization Organization ISO 9001-1987
3. Quality Audits for Improved Performance

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE

REFERENCE NO. OF AV/CHALKBOARD DIAGRAM

1. Client responsible for:
   - goal/objective of audit
   - scope of audit
   - what standard the auditee will be measured against
   - when audit will be conducted & anticipated duration (general)
   - who will conduct audit
   - how the audit results will be used

2. Auditee responsible for:
   - who will represent them
   - access of areas, activities & documentation to be made available
   - support personnel to be provided
   - how proprietary rights will be protected

3. Auditor responsible for:
   - methods to be used
     - measurement ie. o.k. not o.k., graded or statistical.
     - information sources ie. observation, questions, physical examination, written response, documentation.
     - contacts with client & auditee
     - schedule (specific)

4. Planning a systematic audit path with a checklist to include such applicable items as:
   - audit topic
   - organization activity
   - audit dates
   - specific points to examined which can be derived from such applicable items as:
     - external procedures, specifications & contract requirements.
     - internal requirements in company as denoted by any company generated documents.(policies, manuals, work instructions etc.
     - customer requirements
     - regulatory agency requirements
     - history of audit area
     - customer product/service integrity after sale
     - internal quality program
     - industry standards

OTHER INFORMATION (Grading practices, safety, other)

Activities (Can be initial preparation for auditing project)
Select a company and list applicable items for a system quality audit. This will require reasearch into applicable industry stds., military stds., ISO stds. etc.

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XI HRS/INSTRUCTION: LECTURE 6 LAB ____

COURSE TITLE: Product & System Quality Auditing DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit #6 Technical expertise needed by audit team DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Identify characteristics of a competent, qualified auditor.
2. Recognize applicable standards.
3. Define the phrase "due care".
4. Describe the three general classes of auditor impairment.

REFERENCES: 1. How to Plan An Audit, pp.18-20.
2. Audit Standards - A Comparative Analysis, pp. 9-22.
3. Quality Audit - A Management Evaluation Tool.
4. American Quality Audit Standards for Auditors-ANSI/ASQC Q1-1986.
5. Quality Audits for Improved Performance.

STUDENT MATERIALS:

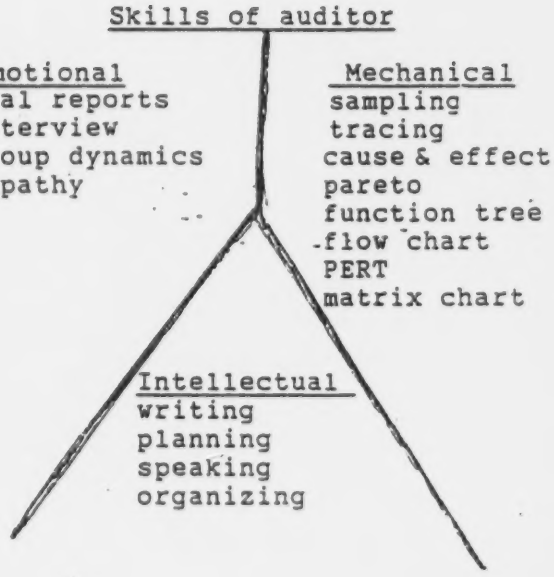
Student texts as denoted above.

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE

REFERENCE NO. OF AV/CHALKBOARD DIAGRAM 2

1. Personal traits of auditor.
2. Knowledge
3. Experience
4. Independence & objectivity
5. Lead auditor
6. Dual purpose audits
7. Education & training
8. Skills
9. Examination/certification
10. Maintenance of qualification
11. Key phrase "due care".
12. Three classes of auditor impairment:
    - personal
    - external
    - organizational



OTHER INFORMATION (Grading practices, safety, other)

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XI HRS/INSTRUCTION: LECTURE 6 LAB ____

COURSE TITLE: Product & System Quality Auditing DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit # 7 Conducting the Audit DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Identify elements of audit planning.
2. Describe five (5) steps in conducting an audit.
3. Evaluate information sources to be used in collecting data.
4. Identify and describe the working papers the audit team uses in planning and implementation of audit.

REFERENCES: 1. Audit Standards - A Comparative Analysis, pp.23-42.
2. How to Plan An Audit , pp.21-37.
3. Quality Audits for Improved Performance.

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

Student text as denoted above.

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE

REFERENCE NO. OF AV/CHALKBOARD DIAGRAM 2

1. Audit Planning:
   - develop understanding of area to be audited.
   - select specific activities to be audited
   - select audit approach
   - determine resource requirements

2. Conducting the audit:
   - introductory meeting with auditee for clarifying goal/objective, scope and approach.
   - collection of data for assessment
     - tracing
     - sampling
     - corroboration
   - documentation, in the form of flow charts or other descriptive techniques, of the system being audited.
   - general verification of compliance or requests for corrective action.

3. Information sources:
   - physical examination
   - written response from 3rd party
   - examination of recorded information to substantiate that something was performed and it met requirements.
   - observation
   - questions (written & oral)

4. Working papers:
   - audit schedules
   - auditor assignments
   - checklists
   - reporting forms

Activity

Students to generate an audit evaluation instrument covering the above areas of an audit to be used in critiquing auditors performance and audits effectiveness.

OTHER INFORMATION (Grading practices, safety, other)

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XI HRS/INSTRUCTION: LECTURE 6 LAB ____

COURSE TITLE: Product & System Quality Auditing DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit #8 Practical Auditing Projects DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Plan an audit using a quality system audit checklist guideline.
2. Implement an audit using accepted procedures as outlined in student material.
3. Issue an audit report using typical audit report format.

REFERENCES: 1. How to Plan an Audit, pp.34-39. (Examples of forms)
2. The Quality Audit - A Management Evaluation Tool, (Examples of questions that can be used in data gathering)
3. Quality Audits for Improved Performance (Examples of forms & glossary of terms)

STUDENT MATERIALS:

Materials as denoted above.

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE

REFERENCE NO. OF
AV/CHALKBOARD DIAGRAM

Activity

Instructor will find organization willing to allow students to conduct a quality system audit. Instructor may act as lead auditor and class as audit team.

1. A statement should be developed to define how auditee must prepare for audit ie. -complete a questionaire to help audit team plan audit
   -send copies of relevent specifications
   -have room available for auditors
   -arrange for required # of escorts

2. Auditor preparation:
   - read auditees specifications, procedures, manuals
   - research auditees history
   - use flow chart to understand system and identify key control points.

3. Students will prepare an audit plan.

4. Pre-audit briefing:
   - key management of the areas to be audited will be friefed on audit plan.
   - additional information about organization can be solicited.

5. Tour of auditee facilities.

6. Lead auditor to give auditors their specific area assignments.

7. Students working in teams will implement audit. Audit team must have daily briefing sessions to assure audit effectiveness.

8. Teams will write audit report.

9. Postaudit briefing:
   - meet with auditees management to present audit report and allow management to ask questions.

OTHER INFORMATION (Grading practices, safety, other)

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XI HRS/INSTRUCTION: LECTURE 6 LAB ____

COURSE TITLE: Product & System Quality Auditing DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit # 9 Critique of Auditing Projects DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Evaluate audit performance.
2. Identify obstacles to performing an effective audit.
3. Generate ways to improve audit process.
4. Identify techniques and methods that were effective in the audit process.

REFERENCES:

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

Evaluation instrument constructed by students in Unit #7.

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE

REFERENCE NO. OF
AV/CHALKBOARD DIAGRAM

Activities

1. Students to evaluate audit performance with audit evaluation constructed by students in Unit #7.
2. Identify obstacles students confronted in performing an effective audit.
3. Identify techniques and methods that were effective in the audit process.
4. Generate ways to improve audit process.

OTHER INFORMATION (Grading practices, safety, other)

WISCONSIN INDIANHEAD VTAE DISTRICT

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XI HRS/INSTRUCTION: LECTURE 6 LAB ____

COURSE TITLE: Product & System Quality Auditing DATE PREPARED: 6/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: ____

Unit # 10 Audit Report Writing DATE REVISED: ____

INSTRUCTIONAL COMPETENCIES

Upon successful completion, the student will be able to:

1. Construct a formal written audit report
2. Evaluate supplementary methods of reporting audit findings.
3. Apply reporting concepts such as:
   - -verifiability
   - -summarizing
   - -"findings"
   - -presentation methods

REFERENCES:
1. How to Plan An Audit, pp.38-39.
2. Audit Standardards - A Comparative Analysis, pp.43-49.
3. Quality Audit a Management Evaluation Tool.

INSTRUCTOR EQUIPMENT/AV NEEDS:

STUDENT MATERIALS:

Student texts as denoted above.

LIST OF EVALUATION MEASURES:

INSTRUCTOR PRESENTATION OUTLINE

REFERENCE NO. OF
AV/CHALKBOARD DIAGRAM

1. Constructing a formal written report:
   - reasons for formal report
   - objectivity
   - verifiability
   - summarizing
   - writing "findings"
   - recommendations
   - corrective actions
   - supplementary appendices

2. Record retention

3. Supplementary reporting methods
   - verbal reports
   - letter form
   - daily written reports
   - graphics

OTHER INFORMATION (Grading practices, safety, other)

C:\231XRCC\PMP\TCOURS\S36GTAT

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline 06/30/89

COURSE TITLE	Statistical Process Control		
COURSE NUMBER	10-623-1XX	CLASSROOM PRESENTATIONS	(A) 36.00
SEMESTER HOURS	72	LAB/CLINICAL/SHOP EXPERIENCE	(B) 36.00
CREDITS	3.00	INDIVIDUAL/INDEPENDENT INSTRUCTION	(C)
CEU'S		SIMULATED/ACTUAL OCCUPATIONAL EXP	(D)
CEC'S		ON-THE-JOB EXPERIENCE	(E)

COURSE DESCRIPTION:
Statistical Process Control is a tool used today by all phases of the industrial effort to improve quality. It utilizes the prevention vs. detection technique in reducing defect problems wherever they arise. Philosophy of quality is studied as well as statistical methods to improve productivity.

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. List reasons why S.P.C. techniques have become popular in U.S. business and industry.
2. Explain the relationships between industrial departments and how they reflect on overall organizational quality.
3. Outline management's role in the commitment to quality in an organization.
4. Calculate basic statistics such as mean, median, mode, standard deviation and construct a frequency diagram for normal and non-normal distribution.
5. Construct an X, R control chart computing X, R upper and lower control limits and plot the data.
6. Interpret a control chart for out of control situations, leave along, non-normalcy and other significant information.
7. Compute the capability of a process using the data from a control chart and determine rate of defect and CPK value.
8. Construct an attributes chart computer P, upper and lower control limits and interpret the data.
9. Develop a precontrol chart for use in computerized data collection from production floor.
10. Develop pareto diagram to highlight problem areas.
11. Create a scattergram to determine cause and effect.

PREPARED BY: SUBMITTED BY:
COORD. APPROVAL: DATE: REVISED:
DISTRICT APPROVAL: DATE:

COURSE TITLE: Statistical Process Control
COURSE NUMBER. 10-623-LXK

COURSE OUILINE BY UNITS:	TYPE OF HOURS -A-	-B-
I. Use of SPC Techniques	6.00	
A. Foreign competition--Japan, Taiwan, Korea		
B. Early efforts--Dr. Deming		
C. Success stories in American industry		
II. Interdepartment Relationships	6.00	
A. Engineering		
B. Manufacturing		
C. Quality control		
D. Management--supervisory		
E. Production workers		
III. Management Role	4.00	
A. Commitment and support		
B. Management development		
C. Future trends		
IV. Introduction--Basic Statistics	4.00	4.00
A. Mean, median, mode		
B. Frequency distribution--normal, non-normal		
C. Construction of histogram		
D. Standard deviation		
E. Sigma % of normal distribution		
V. Construction of Control Charts	4.00	8.00
A. Arranging data--subgroups		
B. Compute X and R		
C. Plotting data		
D. Calculating control limits UCL, LCL		
E. Plotting control limits		
F. Testing for the middle 1/3		
VI. Interpretation of X, R Charts	2.00	3.00
A. Out of control points		
B. Rule of 7		
C. Patterns		
D. Runs		
VII. Process Capability	2.00	6.00
A. Process in statistical control		
B. Capacity evaluation		
C. Estimated standard deviation (Sigma Hat)		
D. Right and left hand tail		
E. Z value -- using the table - % of defect		
F. CPK index		
VIII. Attributes	2.00	6.00
A. Operational definitions		
B. The P chart		
C. Calculation of P chart--control limits		
D. The NP chart		

	E. C and U charts		
IX.	Precontrol A. Uses of precontrol B. Calculation of control limits C. Plotting the chart D. Red, yellow and green decisions E. Gage/computer	2.00	3.00
X.	Pareto Diagrams A. Construction of pareto diagrams B. Uses of pareto diagrams	2.00	3.00
XI.	Scattergrams A. Construction of scattergram B. Interpretation of positive and negative correlation	2.00	3.00
	Totals	36.00	36.00

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XK HRS/INSTRUCTION: LECTURE 36 LAB 36

COURSE TITLE: Statistical Process Control DATE PREPARED: 7/10/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit I - Use of SPC Techniques DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Describe various statistical techniques now being used to control quality.
2. Explain why statistical techniques are a valuable tool used in today's industry.
3. Explain the world economy and why foreign competition is driving the United States to higher quality efforts.
4. Recount the changes and new thinking brought to United States industry by Dr. Deming, Dr. Juran, and other quality leaders in the world.
5. Describe some successful efforts by industry in the drive to improve quality/productivity and reduce costs.
6. Discuss the "Prevention vs. Detection" model.

REFERENCES:

1. Quality, Productivity, and the Competitive Position, Dr. Edward Deming
2. Out of the Crisis, Dr. Edward Deming

INSTRUCTOR EQUIPMENT/AV NEEDS:

Overhead projector
Videotape Module #1 - Transformation of American Industry

STUDENT MATERIALS:

Module #1 - Transformation of American Industry - P.Q. Systems, Dayton, Ohio

LIST OF EVALUATION MEASURES:

Read and understand glossary of terms and symbols, Student Activity Guide.

INSTRUCTOR PRESENTATION OUTLINE:	REFERENCE NO. OF AV-CHALKBOARD DIAGRAM
I. Use of SPC Techniques	
A. Foreign competition	Show videotape "If Japan Can ... " NBC White Paper
B. Early efforts, Dr. Deming, Dr. Juran, etc.	
C. Success stories	

OTHER INFORMATION (Grading practices, safety, other)

1. Read Module #1 - Transformation Series
2. Write report of success story by an industry - periodical
3. Write report of success story by an industry - local.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XK HRS/INSTRUCTION: LECTURE 36 LAB 36

COURSE TITLE: Statistical Process Control DATE PREPARED: 7/12/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit II - Interdepartment Relationships DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Describe the engineering function and how it relates to the quality improvement process.
2. Explain the overall scope of manufacturing and how it deals with quality problems that arise daily.
3. Detail the responsibilities of the Quality Assurance Department and how the Quality Assurance philosophy has changed in recent years.
4. Explain the role of management in assuring quality in an organization and the need for its committed support.
5. Describe how the hourly workers involvement in the quality process is necessary in order to have success in process improvement.
6. Explain what is meant by the phrase "Everyone has a Customer."

REFERENCES:

1. Handout - Quality: The Competitive Advantage, James Houghton, Corning Glass, National Quality Forum III
2. Handout - Dr. Deming's 14 Points

INSTRUCTOR EQUIPMENT/AV NEEDS:

Overhead projector
Video: Module #2, Deming on Quality and Productivity - Transformation Series

STUDENT MATERIALS:

Module #2 - Student Activity Guide - Transformation Series

LIST OF EVALUATION MEASURES:

Report: Select 3 of Dr. Deming's 14 points as hardest to implement and 3 as easiest to implement - why?

INSTRUCTOR PRESENTATION OUTLINE:	REFERENCE NO. OF AV-CHALKBOARD DIAGRAM
II. Interdepartment Relationships	Overhead Transparencies of:
A. Engineering	1. Engineering Print
B. Manufacturing	2. Manufactured Parts
C. Quality Assurance	3. Inspection Devices
D. Management-Supervisory	4. Control Charts
E. Production Workers	5. Organizational Chart

OTHER INFORMATION (Grading practices, safety, other)

Read periodicals in quality magazines.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XK HRS/INSTRUCTION: LECTURE 36 LAB 36

COURSE TITLE: Statistical Process Control DATE PREPARED: 7/13/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit III - Management Role DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Explain the importance of top management's active support of the quality effort.
2. Describe what management must do to remain current in the quality progress.
3. Define the quality improvement team model and methods of implementation.
4. Review all aspects of team improvement techniques such as project selection, project implementation, project evaluation, and continuing improvement.
5. Evaluate future trends in quality advancement such as: Design of experiments, Taguchi factorial design and predictive maintenance.

REFERENCES:

Handouts Explaining Management Role

INSTRUCTOR EQUIPMENT/AV NEEDS:

Overhead projector
Video - Modules 3 & 4, Transformation Series
Video - In Search of Excellence, Tom Peters

STUDENT MATERIALS:

Module #3 - Model for Quality/Productivity Improvement
Module #4 - Project Selection

LIST OF EVALUATION MEASURES:

Report: New Process for Improvement

INSTRUCTOR PRESENTATION OUTLINE:	REFERENCE NO. OF AV-CHALKBOARD DIAGRAM
III. Management Role	Overheads of:
A. Commitment and Support	Project improvement model
B. Management Development	
C. Future Trends	

OTHER INFORMATION (Grading practices, safety, other)

Set up a model Quality Team - Select members, project, method.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XK HRS/INSTRUCTION: LECTURE 36 LAB 36

COURSE TITLE: Statistical Process Control DATE PREPARED: 7/17/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit IV - Introduction - Basic Statistics DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Organize statistical data in a usable form with the aid of flow charts, cause effect diagrams, and data gathering techniques.
2. Define nominal, ordinal, interval, and ratio data.
3. Explain differences of random sampling methods in data collection.
4. Develop a pareto chart based on data from an industrial problem.
5. Define meanings of mean, median, and mode in a statistical sense.
6. Construct histogram of individual readings and determine the frequency distribution to see if the process is normal.
7. Compute mathematically the standard deviation of a set of data and explain its significance.

REFERENCES:

Handouts of data collected for analysis.

INSTRUCTOR EQUIPMENT/AV NEEDS:

Videos: Module #5 - Transformation Series
Module #6 - " "

STUDENT MATERIALS:

Modules 5 & 6 - Student Activity Guide

LIST OF EVALUATION MEASURES:

Exercise 5-4 - Module #5
" 5-5 - "

Exercise 6-1 - Module #6
" 6-2 - "
" 6-3 - "

INSTRUCTOR PRESENTATION OUTLINE:	REFERENCE NO. OF AV-CHALKBOARD DIAGRAM
IV. Introduction - Basic Statistics	Overhead transparencies of:
A. Mean, Median, Mode	1. Mean, medium, mode
B. Frequency distribution Normal, non-normal	2. Normal and not normal frequency
C. Construction of histogram	3. Histogram of individuals and means.
D. Standard Deviation	4. Standard deviation of normal curve.
E. Sigma percent of normal distribution	5. Pareto chart.

OTHER INFORMATION (Grading practices, safety, other)

Develop histogram of means and individual reading and test for normalcy and compare curves and variability.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XK HRS/INSTRUCTION: LECTURE 4 LAB 8

COURSE TITLE: Statistical Process Control DATE PREPARED: 8/3/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit V: Construction of Control Charts DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Arrange data into statistical sub-groups and know the importance of random sampling.
2. Compute $\bar{X}$ and range within the sample.
3. Construct a control chart with $\bar{\bar{X}}$ and $\bar{R}$ calculated and plot in $\bar{X}$ and R readings on the chart.
4. Calculate the upper and lower control limits for the X process and place them on the control chart.
5. Calculate the upper and lower control limits for the range and place the on the control chart.

REFERENCES:

Instructor Handouts: Control Charts

INSTRUCTOR EQUIPMENT/AV NEEDS:

Overhead projector
Video: Module #7, Part 1 - Transformation Series
Overheads illustrating construction of control charts

STUDENT MATERIALS:

Module #7 - Student Activity Guide - Transformation Series

LIST OF EVALUATION MEASURES:

Exercise 7-1, Module #7
Construct Control Chart

INSTRUCTOR PRESENTATION OUTLINE:	REFERENCE NO. OF AV-CHALKBOARD DIAGRAM
V. Construction of Control Charts	Control Chart, O.H.
A. Arranging Data - Sub-Groups	
B. Compute X and R	
C. Plotting Data	
D. Calculating control limits	
E. Plotting Control Limits	

OTHER INFORMATION (Grading practices, safety, other)

Read Chapter 7, pages 1-20, Student Activity Guide

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XK HRS/INSTRUCTION: LECTURE 2 LAB 3

COURSE TITLE: Statistical Process Control DATE PREPARED: 8/3/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit VI - Interpretation of $\bar{X}$, R Charts DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Plot the percentages for normal distribution and test for normalcy.
2. Define the difference between common cause and special cause.
3. Detect an out of control point in either the $\bar{X}$ or R chart and explain its significance.
4. Explain what is statistically wrong with seven or more points on the same side of the $\bar{X}$ line on a control chart.
5. Define what is meant by patterns on a control chart and what a "run up" and a "run down" means.
6. Test for the "Middle Third" on a control chart and explain its statistical significance.

REFERENCES:

Instructor handouts showing not normal situations.

INSTRUCTOR EQUIPMENT/AV NEEDS:

Overhead projector
Video: Module #7, Part 2, Transformation Series
Overheads concerning interpretation of control charts

STUDENT MATERIALS:

Module #7 - Student Activity Guide - Transformation Series

LIST OF EVALUATION MEASURES:

Exercise 7-2, Module #7, Interpret Control Chart

INSTRUCTOR PRESENTATION OUTLINE:	REFERENCE NO. OF AV-CHALKBOARD DIAGRAM
VI. Interpretation of Control Charts	O.H. Out of Control Points
A. Out of Control Points	Run of 7
B. Rule of 7	Middle Third
C. Patterns	
D. Runs	
E. Testing for Middle Third.	

OTHER INFORMATION (Grading practices, safety, other)

Analyze industrial control charts supplied by local industry.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XK HRS/INSTRUCTION: LECTURE 2 LAB 6

COURSE TITLE: Statistical Process Control DATE PREPARED: 8/4/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit VII - Process Capability DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Analyze a process for statistical control and normalcy.
2. Determine process capability by using equations determining $\bar{\bar{X}}$, $\hat{\sigma}$, USL, and LSL (upper and lower specification limits).
3. Calculating the estimate of the process standard deviation 6 (Sigma Hat).
4. Plot the right hand and left hand tail of the process variation and draw the normal curve placing the data on the chart.
5. Compute the Z value for percent of probable defect for the process.
6. Calculate the CPK values that describe process capability.
7. Describe skewed distributions and their probable causes in a process.

REFERENCES:

Instructor handouts showing process capability.

INSTRUCTOR EQUIPMENT/AV NEEDS:

Video, Module 8, Transformation Series

STUDENT MATERIALS:

Module 8, Student Activity Guide - Transformation Series

LIST OF EVALUATION MEASURES:

Exercise #8-2

Industrial examples - capability studies

INSTRUCTOR PRESENTATION OUTLINE:	REFERENCE NO. OF AV-CHALKBOARD DIAGRAM
VII. Process Capability	O.H. - Process Capable in Control
A. Process in Statistical Control	O.H. - Process Capable Not in Control
B. Capacity Evaluation	O.H. - Process Not Capable in Control
C. Est. Std. Deviation - Sigma Hat	O.H. - Process Not Capable Not in Control
D. Right and Left Hand Tail	
E. Z Value - Percent of Defect	
F. CPK Index	

OTHER INFORMATION (Grading practices, safety, other)

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XK HRS/INSTRUCTION: LECTURE 2 LAB 6

COURSE TITLE: Statistical Process Control DATE PREPARED: 2/5/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit VIII - Attributes DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Establish operational definitions for attribute criteria.
2. Develop a P chart for attributes using either constant or varying sample size data.
3. Plot the control limits of the P chart and the data points.
4. Analyze the chart for out of control conditions.
5. Construct a NP chart with control limits and data.
6. Construct C and U charts as above and analyze the data.

REFERENCES:

Instructor Handouts for Attribute Data

INSTRUCTOR EQUIPMENT/AV NEEDS:

Video - Module 10 - Transformation Series

STUDENT MATERIALS:

Module 10 - Student Activity Guide - Transformation Series

LIST OF EVALUATION MEASURES:

Exercise 10-2

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF AV-CHALKBOARD DIAGRAM

VIII. Attributes

A. Operational definitions — O. H. Attribute Charts P, NP, C, and U

B. The P chart

C. Calculations for P chart

D. The NP chart

E. C and U charts

OTHER INFORMATION (Grading practices, safety, other)

Set up operation definitions and chart a process, example (popcorn)

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XK HRS/INSTRUCTION: LECTURE 2 LAB 3

COURSE TITLE: Statistical Process Control DATE PREPARED: 8/10/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit IX Precontrol DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Explain the uses of precontrol and the conditions where it is most beneficial.
2. Calculate precontrol limits for chart and explain the statistical significance of the limits.
3. Plot values on a precontrol chart and determine any out of control situation.
4. Make decisions based on a combination of green, yellow, and red conditions.
5. Evaluate computer/gage installations and recommend correct hardware and software.

REFERENCES:

Instructor Handouts Describing Conditions for Precontrol
Instructor Handouts Describing Decisions for Precontrol

INSTRUCTOR EQUIPMENT/AV NEEDS:

Overhead projector
Overheads of charts
Overheads of precontrol stations

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Develop precontrol chart from instructor criteria.

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF AV-CHALKBOARD DIAGRAM

IX. Precontrol

A. Uses of precontrol

B. Calculation of control limits

C. Plotting the chart

D. Red, yellow, and green decisions

E. Gage/computer installation

O.H. Precontrol charts
Decision making

OTHER INFORMATION (Grading practices, safety, other)

Check industrial parts using precontrol.
Construct chart and plot.

WISCONSIN INDIANHEAD TECHNICAL COLLEGE

INSTRUCTIONAL PLAN

COURSE NUMBER: 10-623-1XK HRS/INSTRUCTION: LECTURE 2 LAB 3

COURSE TITLE: Statistical Process Control DATE PREPARED: 8/15/90

INSTRUCTIONAL PLAN TITLE AND/OR NUMBER: DATE REVISED: _____

Unit XI Scattergrams DATE REVISED: _____

INSTRUCTIONAL COMPETENCIES:

Upon successful completion, the student will be able to:

1. Construct a scattergram from two sets of data for cause and effect analysis.
2. Interpret the chart for a positive,negative, or no correlation between the X and Y variables.
3. Test for significance of the data between one and five percent.

REFERENCES:

Instructor Handouts - Scattergrams
Instructor Handouts - Scale Charts

INSTRUCTOR EQUIPMENT/AV NEEDS:

Overhead Projector
Scattergram Overhead

STUDENT MATERIALS:

LIST OF EVALUATION MEASURES:

Develop a scattergram from data on handout.
Determine positive, negative, or no correlation.

INSTRUCTOR PRESENTATION OUTLINE:

REFERENCE NO. OF
AV-CHALKBOARD DIAGRAM

OTHER INFORMATION (Grading practices, safety, other)

C6991X2CO/PNDFTCOURS/S38QTXT

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline 04/18/91

COURSE TITLE Internship - Industrial/Technical
COURSE NUMBER 10-699-1X2 CLASSROOM PRESENTATIONS (A)
SEMESTER HOURS 216 LAB/CLINICAL/SHOP EXPERIENCE (B)
CREDITS 3.00 INDIVIDUAL/INDEPENDENT INSTRUCTION (C)
CEU'S SIMULATED/ACTUAL OCCUPATIONAL EXP (D) 216.0
CEC'S ON-THE-JOB EXPERIENCE (E)

COURSE DESCRIPTION:

Internship is designed to provide students with on-the-job experience in actual work situations. These experiences strengthen student competencies through participation in a wide variety of occupational experiences, ranging from routine assignments to specialized work-related duties. (PREREQUISITES: Appropriate occupational courses and a minimum of one-year successful associate degree program competencies and/or instructor approval.)

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. Understand job positions with corresponding responsibilities.
2. Demonstrate professional attitudes, appearance, work habits, and confidentiality.
3. Understand position interrelationships.
4. Establish priorities in organizing and completing work assignments.
5. Apply occupational competencies to work assignments.
6. Accept constructive criticism.

NOTE: The level of competency achievement required will vary depending on completion of the full course or fraction(s) thereof.

PREPARED BY: SUBMITTED BY: Kurt L. Bents
COORD. APPROVAL: DATE: REVISED:
DISTRICT APPROVAL: DATE:

COURSE TITLE: Internship - Industrial/Technical 2
COURSE NUMBER: 10-699-1X2 04/18/91

COURSE OUTLINE BY UNITS:	TYPE OF HOURS	
	—	D
I. Establish training station working cooperatively with the campus instructor and internship employer and division supervisor		
II. During internship and at completion student identifies work assignments.		
III. Campus instructor visits intern at site of employment		
IV. Internship employer evaluates student's work habits and attitudes		
V. On-campus discussion groups relating internship experiences		
Simulated Actual Occupational Experience	216	
Totals	216	0

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

1. Instructor(s) prepared materials.
2. Training and/or insurance agreement.

Wisconsin Indianhead
Technical College

TRADE & INDUSTRY DIVISION
INTERNSHIP EDUCATION PROGRAM

QUESTIONS AND ANSWERS

1. **What is WITC?**

   Wisconsin Indianhead Technical College is one of sixteen technical colleges in Wisconsin providing skilled education and training to industry and individuals. Wisconsin Indianhead Technical College has graduated over 10,000 technically skilled individuals since 1941. The mission of WITC is to improve the individual's quality of life and to maintain the strength of Northwest Wisconsin's economic growth and vitality. WITC responds to these challenges with technical education, vocational education, general education, apprenticeship education, adult and continuing education, remedial education and economic development.

2. **What is the Internship Education Program?**

   The Internship Education Program is offered to WITC students. Participants can earn up to three credits for working in industrial jobs related to their major program. The program emphasizes a cooperative relationship between the industry representative, WITC, and the student.

3. **What is the Purpose?**

   The purpose of the internship is to help students apply concepts and skills learned in college to the workplace, acquire knowledge, skills and understanding available only on-the-job, and gain work-related experience.

4. **Who are Internships For?**

   Internships are available to students in the Quality Assurance Technician, two-year, associate degree program.

5. **How Does Internship Education Differ from Part-Time Employment?**

   Internship students are committed to careers in their respective areas of employment as evidenced by their enrollment at WITC. Therefore, students have a definite interest in learning more about their careers. Students are required to attend a weekly classroom discussion where they review projects, goals, reports and issues related specifically to their field of employment. General topics about goal setting, problem solving, human relations and other job-related areas are also covered.

6. **Why is Internship Training Important?**

   On-the-job "real world" experience is extremely difficult to replicate in the classroom. However, the opportunity to apply and practice classroom knowledge in an actual work environment can significantly increase the student/trainee's understanding of classroom concepts.

7. **What Obligations Does the Employer Have?**

   The employer agrees to provide training experiences for the student/trainee; to furnish a rating of the student/trainee's performance; and to intern a student/trainee for a minimum of 72 (216 maximum) hours per summer.

Wisconsin Indianhead
Technical College

TRADE & INDUSTRY DIVISION
INTERNSHIP EDUCATION PROGRAM

INTERNSHIP TRAINING AGREEMENT

Wisconsin Indianhead Technical College
1900 College Drive
Rice Lake, Wisconsin 54868

The primary goal of the internship course is to help the student/trainee apply concepts and skills acquired in classes at Wisconsin Indianhead Technical College to the work situation; to acquire job-related competencies not available in the school environment; and to gain work experience through the relationships and responsibilities encountered on the job. The student is a learner and will not replace current employees of the industry.

This is an agreement between all parties involved whereby either party may terminate this agreement for just cause after discussing situations with the Wisconsin Indianhead Technical College internship instructor.

It is agreed that

_____ (Name of Industry Representative)

_____ (Address)

_____ (City, State, Zip Code)

_____ (Telephone Number)

has agreed to cooperate in an internship agreement, with:

_____ (Name of student/trainee)

a student at Wisconsin Indianhead Technical College in the Trade and Industry Division and enrolled in:

_____ (Name and number of course)

Involvement dates:

_____ (First date of employment)

_____ (Last date of employment)

Continued on next page...

☑ WISCONSIN INDIANHEAD TECHNICAL COLLEGE AGREES TO:

- Provide an internship instructor to supervise student/trainee activities.
- Provide related classroom instruction.
- Two weeks prior to the starting date, have an instructor meet with the employer to discuss the student/trainee's plan, curriculum, and goals. The instructor will make periodic contacts to consult with employer.
- Conduct evaluation of student/trainee performance between the employer and instructor.
- Assist the student/trainee in developing an internship plan which meets the educational goals of the Wisconsin Indianhead Technical College.
- Encourage student/trainees to maintain safety, health and other requirements of the employer and policies and procedures of the Wisconsin Indianhead Technical College.

☑ THE INDUSTRY REPRESENTATIVE AGREES TO:

- Provide training experiences for the student/trainee to complete learning experience goals which are mutually agreed upon by the Wisconsin Indianhead Technical College and the employer.
- Furnish a rating of the student/trainee's performance.
- Engage the services of the student/trainee for the minimum number of hours required for each credit taken at Wisconsin Indianhead Technical College during the training period specified. (3 credits equals 214 semester hours)
- Consult with the internship instructor about the student/trainee's progress, behavior or infractions of regulations or policies.
- Provide time for student/trainee advisement, coaching or counseling as to progress.
- Provide emergency care to the student/trainee on the same basis as other employees.

☑ THE STUDENT/TRAINEE AGREES TO:

- Remain with the original industry until the end of the semester.
- Honor the rules, regulations, and policies of the internship program, the industry and the Wisconsin Indianhead Technical College.
- Perform and fulfill the assigned responsibilities of the internship.
- Comply with mandatory attendance in school and on the internship.
- Accumulate the total number of hours on the job per credit(s) registered.
- Process all reports and complete all assignments in the semester enrolled.
- Immediately inform the Wisconsin Indianhead Technical College internship instructor and industry representative of any concerns or issues.

****TRAINING LEARNING PLAN TO BE ATTACHED**

_____ _____
WITC Student/Trainee's Signature Date

_____ _____
Industrial Representative's Signature Date

_____ _____
WITC Instructor/Coordinator's Signature Date

INTERNSHIP COURSE COMPONENTS

Technical Internship Applications

The technical internship course provides the student/trainee an opportunity to learn in a structured employment environment under the supervision of a sponsoring industry and an instructor from WITC. Under this program, the student/trainee can earn one to three credits and gain practical work experience in an area directly related to his or her career major. It is recommended that the student/trainee work a minimum of 12 hours per week throughout the internship assignment. In addition, attendance at a weekly internship class is required. Internship learning goals, projects, reports, and discussions will relate specifically to the student/trainee's employment.

Internship Assignment

The assignment will start as soon as the student/trainee is sponsored by an industry, has completed the Internship Training Agreement (Attachment A) and Student/Trainee Learning Plan, (Attachment B) is formally enrolled in the Internship course, and has paid appropriate fees. The student/trainee will be formally evaluated by his or her supervisor during the internship assignment (see Attachment C, Student Performance Evaluation). The student/trainee's Goal Summary Report (as described on the following page) will be completed prior to final evaluation.

Internship Class

The internship class, a required component of the internship course, will meet each week throughout the semester. The format will include discussion designed to encourage student/trainees to share their internship experiences and progress on learning goals with other student/trainees. During any week when there is not a scheduled class session, student/trainees will be expected to brief the instructor on their progress and performance relative to internship projects and learning goals. Student/trainee attendance at all scheduled internship activities is mandatory. Attendance will be recorded.

Bi-weekly Experiences Report

Student/trainees will be required to complete Bi-weekly Reports (Attachment D). These reports summarize hours worked during the month, on-the-job experiences, and progress on project and learning goals. The reports also ask student/trainees to list problems, express concerns and suggest specific topics for classroom discussion.

Goal Summary Report

A summary report is required of all student/trainees upon completion at the end of the semester of all learning goals. Specific guidelines for this final report include:

1. All summary reports will be typewritten and in proper grammatical form.
2. The report will summarize a goal or project that the student/trainee has accomplished during the semester internship. This summary will include:
   a. The goal number (from the Student/Trainee Learning Plan) and the date the goal was completed.
   b. The goal statement as made on the learning plan.
   c. A specific description of what the student/trainee did (or tried to do) in regard to the goal.
   d. The results of the student/trainee's pursuit of the goal including an explanation of what was learned as a result of the internship experience.

Continued on next page...

Goal Summary Report Continued...

e. A description of difficulties or problems encountered in accomplishing the goal, including recommended changes the student/trainee or sponsoring industry (or both) would make if this experience was repeated.
f. A description of the industrial representative's reaction to the student/trainee's discussion of his or her goal performance with the industrial representative. Include suggestions made by either party.
g. Attached samples or copies of work produced by the student/trainee to meet his or her goal.
h. A personal evaluation of the student/trainee's goal performance on the following scale:
   4 = Outstanding accomplishment of goal;
   3 = Above average accomplishment of goal (i.e. accurate, prompt completion of goal but not as thorough as could be);
   2 = Average accomplishment of goal (i.e. met minimum requirements of accuracy and promptness although completeness was marginal);
   1 = Significant progress made but goal not accomplished;
   0 = Goal not accomplished.

Grading

Student/trainee will be working on several learning goals and/or projects throughout the internship. Reporting on these job-related learning goals and projects will be important. Grades will be based on the following composite factors:

1. Industrial representatives evaluation of student/trainee's overall on-the-job performance.
2. Completion of established goals and class projects including accuracy, thoroughness and promptness of summary reports.
3. Class performance including the accuracy, thoroughness and promptness of all reports and assignments ordered by the instructor, attendance, and class participation.

STUDENT/TRAINEE LEARNING PLAN

STUDENT/TRAINEE:	TRAINING STATION/TRAINING SPONSOR:

LEARNING PLAN	Final Evaluation*		
	Student	Instructor	Indus. Rep.
Date:_____			

*End of Internship Rating Scale; 4=Outstanding Accomplishment of Goal; 3=Above Average Accomplishment of Goal; 2=Average Accomplishment of Goal; 1=Significant progress made but goal not accomplished; 0=Goal not accomplished.

We the undersigned agree with the validity of the learning goals listed above. The internship sponsor and the Wisconsin Indianhead Technical College agree to provide the necessary support to allow the student to successfully complete the goals listed above. (The internship instructor/coordinator signatures of approval from the student/trainee and employer/supervisor.)

Student/Trainee's Signature _____ Instructor's Signature _____ Industrial Rep's. Signature _____

STUDENT PERFORMANCE EVALUATION

INDUSTRIAL REPRESENTATIVES NAME:	STUDENT/TRAINEE'S NAME:
Rating Period: From:_____ To:_____ Date of Rating:	Number of months in present position:

Prepare this rating carefully and accurately. Its value lies in the impartiality and sound judgement used by the evaluator. Judge each characteristic or trait separately. You should not let your evaluation of one trait unduly influence you on another. Keep in mind that this rating should express an evaluation of the intern in comparison with other doing the same or similar work. make no entry except where statement is based on personal knowledge. Please indicate individual's progress to date by placing a circle around the appropriate rating. Be certain to read the descriptions in each category before rating.

QUANTITY OF WORK- Consider quantity of work and promptness with which it is completed. Industrial Representative Comment:	Unsatisfactory Fair Satisfactory Very Good Excellent Unknown
QUALITY OR WORK- Consider neatness, accuracy, and general efficiency of work. Does the student constantly maintain high workmanship in this respect? Industrial Rep's Comment:	Unsatisfactory Fair Satisfactory Very Good Excellent Unknown
KNOWLEDGE OF JOB- Consider how much the student knows about internship and of other work closely related to it and work in other department. Industrial Rep's Comment:	Unsatisfactory Fair Satisfactory Very Good Excellent Unknown
INITIATIVE- Consider ability to act on own responsibility in absence of instructions. Can student/trainee start needed work and go ahead. Industrial Rep's Comment:	Unsatisfactory Fair Satisfactory Very Good Excellent Unknown
APTITUDE AND ABILITY TO LEARN- Consider how quickly the student learns new work, retains what has been learned, and ease with which instructions are followed. Industrial Rep's Comment:	Unsatisfactory Fair Satisfactory Very Good Excellent Unknown
ATTENTION TO DUTY- Consider ability to work thoroughly and conscientiously. Industrial Rep's Comment:	Unsatisfactory Fair Satisfactory Very Good Excellent Unknown

DEPENDABILITY- Consider the amount of supervision required. Can you depend on the student/trainee's word? Punctuality? Attendance? **Industrial Rep's Comment:**	**Unsatisfactory** **Fair** **Satisfactory** **Very Good** **Excellent** **Unknown**
JUDGMENT- Consider the intelligence and thought used in arriving at decisions. Does the student/trainee have the ability to think and act calmly, logically, and rapidly under stress? **Industrial Rep's Comment:**	**Unsatisfactory** **Fair** **Satisfactory** **Very Good** **Excellent** **Unknown**
COOPERATION- Consider willingness to work with and help others. Is student willing to assume the full share of work and responsibility? **Industrial Rep's Comment:**	**Unsatisfactory** **Fair** **Satisfactory** **Very Good** **Excellent** **Unknown**
PERSONALITY- Consider appearance, tactfulness, self-confidence, integrity, loyalty, and the impression made on others. **Industrial Rep's Comment:**	**Unsatisfactory** **Fair** **Satisfactory** **Very Good** **Excellent** **Unknown**

-Is student satisfactory in present position? **Yes** **No**

-If unsatisfactory or questionable in present position state reason why:

-State any factors you fell reduce the effectiveness of the student's work:

-Give other pertinent facts, especially with reference to character, habits and special skills, which should be known. Refer to weaknesses as well as strengths.

-Has student/trainee made progress? **Yes** **No** **N/A** **Unknown**

-Do you consider the student/trainee capable of future advancement? **Yes** **No** **N/A** **Unknown**

-Have unfavorable entries been brought to the attention of the student/trainee under your supervision prior to preparing this rating? **Yes** **No**

-How many weeks has this student/trainee been under your guidance? _____

_____

Signature of Rating Official Date

_____

Signature of Student/Trainee Date

Wisconsin Indianhead
Technical College

TRADE & INDUSTRY DIVISION
INTERNSHIP EDUCATION PROGRAM

EMPLOYMENT & EXPERIENCES REPORT

STUDENT/TRAINEE:	TRAINING STATION/TRAINING SPONSOR:

Month covered by this report: _____

Record the number of hours worked for each of the weeks in the month.

_____ HOURS WORKED - WEEK 1 _____ (date) to _____ (date)

_____ HOURS WORKED - WEEK 2 _____ to _____

_____ HOURS WORKED - WEEK 3 _____ to _____

_____ HOURS WORKED - WEEK 4 _____ to _____

_____ HOURS WORKED - WEEK 5 _____ to _____

_____ TOTAL HOURS

_____

Industrial Representative's Signature

1. Summarize new experiences, progress made on goals and projects, and/or problems which occurred during this month.

2. List problems, concerns and/or topics you would like the internship instructor to discuss in class. Be <u>specific!</u>

_____ _____

Student/Trainee's Signature Date

Submit this report to the internship instructor.

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline 06/30/89

COURSE TITLE	Statistical Analysis		
COURSE NUMBER	10-804-1XA	CLASSROOM PRESENTATIONS	(A) 54.00
SEMESTER HOURS	54	LAB/CLINICAL/SHOP EXPERIENCE	(B)
CREDITS	3.00	INDIVIDUAL/INDEPENDENT INSTRUCTION	(C)
CEU'S		SIMULATED/ACTUAL OCCUPATIONAL EXP	(D)
CEC'S		ON-THE-JOB EXPERIENCE	(E)

COURSE DESCRIPTION:

An inferential statistics course that introduces probabilities and the Binomial, Poisson and normal probability distributions. Sampling concepts and distributions are discussed and related to the central limit theorem. Various one sample and two sample hypothesis testing procedures are covered along with chi square analysis and linear regression relationships.

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. Define probability.
2. Correctly use addition and multiplication rules to perform probability computations.
3. Use probabilities to compute expected values.
4. Define probability distributions and calculate the probabilities in Binomial, Poisson, and normal distributions.
5. Use computer programs to simulate dice experiments.
6. Choose the correct sample size and sampling plan for the problem under consideration.
7. Define the central limit theorem and explain the relationship that exists between the standard error of the mean and the sample size.
8. Define the law of large numbers.
9. Compute estimates of population means at different levels of confidence for known and unknown values of the population standard deviation.
10. Compute one sample hypothesis tests of means for both known and unknown values of the population standard deviation.
11. Compute two sample hypothesis tests of means for both known and unknown values of the population standard deviation.
12. Use chi-square methods for k-sample hypothesis tests of percentages.
13. Use chi-square concepts for goodness of fit tests.
14. Use linear regression equations to demonstrate causal relationships between two variables.

PREPARED BY: Gene Lorenz SUBMITTED BY: Bill Rhiger
COORD. APPROVAL: George Pratt DATE: REVISED:
DISTRICT APPROVAL: Lois Eichman DATE:

COURSE TITLE: Statistical Analysis
COURSE NUMBER: LO-804-LXA

2
06/30/87

COURSE OUTLINE BY UNITS:	TYPE OF HOURS -A-	-B-
I. Probability and Probability Distributions A. Meaning and Types 1. A priori 2. Imperical 3. Subjective B. Probability Computations 1. Addition rule for mutually exclusive events 2. Addition rule for non-mutually exclusive events 3. Multiplication rule for independent events 4. Multiplication rule for dependent events C. Expected Value 1. Dice 2. Cards F. Use of Shewharts Bowl to Demonstrate Probabilities G. Probability Distribution 1. Binomial 2. Normal 3. Poisson	18.00	
II. Sampling Concepts A. Simple Random Sampling B. Stratified Sampling C. Cluster Sampling D. Sampling Distribution of Means 1. Mean of the sampling distribution of means 2. Standard deviation of the sampling distribution of means 3. Central limit theorem	6.00	
III. Estimating Means and Percentages A. Interval Estimation of the Population Mean for Known and Unknown Population Standard Deviation 1. Confidence levels B. t Distribution 1. Degrees of freedom C. Determination of Sample Size	6.00	
IV. Testing Hypotheses - One Sample Procedure, z and t distribution A. Null and Alternative Hypotheses, Levels of Significance B. Decision Rules C. Statistical Decisions D. One Sample Hypothesis Tests of Means E. One and Two Tailed Tests When the Population Standard Deviations are Both Known and Unknown	6.00	

V. Testing Hypotheses - Two Sample Procedures	6.00	
A. Two Tailed When the Population Standard Deviations are Known and Unknown		
B. One Tailed When the Population Standard Deviations are Known and Unknown		
VI. Chi-Square Analysis	6.00	
A. The Chi-Square Distribution		
B. K-Sample Hypothesis Text of Percentages		
C. Goodness of Fit Chi Square Test		
VII. Linear Relationship Between Two Variables	6.00	
A. Linear Regression and Scatter Grams		
B. Estimation of Regression Lines		
Totals	54.00	0

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

Statistics, a Fresh Approach - Sanders, Eng, and Murph, McGraw Hill
Sampling Techniques - Cochran, John Wiley and Sons
Statistical Quality Assurance - Guldner, Delmar
Statistics - William Hays, Holt Rinehart
Introduction to Probability and Statistics, Mendenhall 7th Edition, Duxbury

CAMPUS: Rice Lake DATE PREPARED: _____

PROGRAM: _____ DATE REVISED: _____

INSTRUCTOR: Gene Lorenz DATE REVISED: _____

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT PLAN OF INSTRUCTION

COURSE TITLE: Statistical Analysis COURSE NUMBER: 10-804-1XA

LESSON/UNIT NO.: 1 TITLE: Probability and Probability Distribution

TIME (APPROXIMATE) LECTURE: 18 hrs.

LABORATORY: _____

I. OBJECTIVES/COMPETENCIES

Upon successful completion of this lesson/unit, the student should be able to:

1. Define probability and explain how probabilities can be classified.
2. Perform probability computations using the multiplication and addition rules.
3. Compute expected values as they relate to probabilities.
4. Explain what a probability distribution is.
5. Compute probability as related to a poisson distribution.
6. Compute probabilities as related to a binomial distribution.
7. Compute probabilities as related to a normal distribution.
8. Construct operating characteristic curves for acceptance sampling problems.

II. PRESENTATION OUTLINE

	REQUIRED SOURCES
A. Definition of Probability	Chap 5 Sanders P 116
B. Classifications of Probability	Chap 5 Sanders
1. a priori	P 117-118
2. imperical	
3. subjective	
C. Probability Computations	Chap 5 Sanders
1. addition rule	
a. mutually exclusive events	
b. non-mutually exclusive events	
2. Multiplication rule	
a. independent events	
b. dependent events	
3. Counting rules	
a. combinations	
b. permutations	
D. Expected Value (mathematical expectation)	Chap 5 Sanders
1. games	
a. dice	
b. roulette	also, see additional
c. other (determining insurance premiums, etc)	resources below
d. use of microcomputers to demonstrate expected value	teacher prepared material
E. Probability Distribution	Chap 5 Sanders
1. binomial distribution	
a. lot acceptance sampling for defectives	
b. operating characteristic curves for sampling plans - acceptance sampling	also, see additional
c. use of microcomputers to demonstrate sampling plans	resources
2. poisson distributions	
a. operating characteristic curve for sampling plans (poisson approximation to the binomial distribution)	
3. Normal distribution	
a. normal approximation to the binomial distribution	
b. use of microcomputers to show approximation	

Lecture presentation
Microcomputer with appropriate software

III. STUDENT EVALUATION

Text and teacher prepared problems for daily assignments.

Teacher prepared quizes and unit test.

IV. ADDITIONAL RESOURCE MATERIALS

Teacher prepared microcomputer software.
Chap 5 - Statistics - A Fresh Approach, Sanders, Eng, Murph, McGraw-Hill
Chap 3-6 - Intro to Probability and Statistics - Mendenhall, Duxbury
Chap 6&7 - Schaum's Outline Series, Theory and Problems of Statistics, 2nd Edition, Spiegel, McGraw-Hill
Chap 5 - Statistical Quality Assurance - Guldner, Delmar

Use additional pages if more space is needed.

CAMPUS: Rice Lake DATE PREPARED: _____

PROGRAM: _____ DATE REVISED: _____

INSTRUCTOR: Gene Lorenz DATE REVISED: _____

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT PLAN OF INSTRUCTION

COURSE TITLE: Statistical Analysis COURSE NUMBER: 10-804-1XA

LESSON/UNIT NO.: 2 TITLE: Sampling Concepts

TIME (APPROXIMATE) LECTURE: 6 hrs.

LABORATORY: _____

I. OBJECTIVES/COMPETENCIES

Upon successful completion of this lesson/unit, the student should be able to:

1. Explain the importance of and advantages of sampling.
2. Define and explain the concept of simple random sampling.
3. Define and explain the concept of stratified sampling.
4. Define and explain the concept of cluster sampling.
5. Describe the steps required to produce a sampling distribution of sample means.
6. Calculate the mean of a sampling distribution.
7. Calculate the standard deviation of the sampling distribution (standard error of the mean).
8. Define and explain the central limit theorem and the relationship between the sample size and the standard error of the mean.

II. PRESENTATION OUTLINE

REQUIRED SOURCES

A. Purpose and importance of sampling — Chap 6 Sanders

B. Kinds of samples — Chap 6 Sanders
   1. judgment samples
   2. probability samples
      a. simple random
      b. stratified
      c. cluster

C. Sampling distribution of means — Chap 6 Sanders
   1. mean of the distribution
   2. standard deviation of the sampling distribution of the means
   3. central limit theorem

D. Sampling distribution of percentages (proportions) — Chap 6 Sanders
   1. mean of the distribution
   2. standard deviation of the distribution

Lecture presentation

III. STUDENT EVALUATION

Text and teacher prepared problems for daily assignments.

Teacher prepared quiz and test.

IV. ADDITIONAL RESOURCE MATERIALS

Chap 6 - Statistics - A Fresh Approach, Sanders, Eng, Murph, McGraw-Hill

Chap 7 - Introduction to Probability and Statistics - Mendenhall, Duxbury

Use additional pages if more space is needed.

CAMPUS: Rice Lake DATE PREPARED: _____

PROGRAM: _____ DATE REVISED: _____

INSTRUCTOR: Gene Lorenz DATE REVISED: _____

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT PLAN OF INSTRUCTION

COURSE TITLE: Statistical Analysis COURSE NUMBER: 10-804-1XA

LESSON/UNIT NO.: 3 TITLE: Estimating Means and Percentages

TIME (APPROXIMATE) LECTURE: 6 hrs.

LABORATORY: _____

I. OBJECTIVES/COMPETENCIES

Upon successful completion of this lesson/unit, the student should be able to:

1. Estimate the population mean from an appropriate sample with or without knowing the standard deviation.
2. Estimate the population proportion using an appropriate sample.
3. Determine the appropriate sample size to use to estimate the population proportion or mean.

II. PRESENTATION OUTLINE

REQUIRED SOURCES

A. Interval estimation of the population mean - normal distribution — Chap 7 Sanders

1. confidence levels
   a. confidence coefficient
2. estimating the population mean with known standard deviation
3. estimating the population mean with unknown standard deviation

B. Interval estimation of the population — Chap 7 Sanders

1. degrees of freedom

C. Interval estimation of the population proportion — Chap 7 Sanders

D. Determination of sample size — Chap 7 Sanders

1. population mean
2. population proportion

Lecture presentation

III. STUDENT EVALUATION

Text and teacher prepared problems for daily assignments.

Teacher prepared quizzes and unit test.

IV. ADDITIONAL RESOURCE MATERIALS

Chap 7 - Statistics - A Fresh Approach, Sanders, Eng, Murph, McGraw-Hill

Chap 8 - Introduction to Probability & Statistics, Mendenhall 7th Edition, Duxbury

Use additional pages if more space is needed.

CAMPUS: Rice Lake DATE PREPARED: _____

PROGRAM: _____ DATE REVISED: _____

INSTRUCTOR: Gene Lorenz DATE REVISED: _____

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT PLAN OF INSTRUCTION

COURSE TITLE: Statistical Analysis COURSE NUMBER: 10-804-1XA

LESSON/UNIT NO.: 4 TITLE: Testing Hypothesis One-Sample Procedures. z and t-distribution

TIME (APPROXIMATE) LECTURE: 6 hrs.

LABORATORY: _____

I. OBJECTIVES/COMPETENCIES

Upon successful completion of this lesson/unit, the student should be able to:

1. Explain the term "statisticallly significant."
2. Compute one-sample hypothesis tests (both one and two tailed) of means when the population standard deviation is known.
3. Compute one-sample hypothesis tests (both one and two tailed) when the population standard deviation is unknown.
4. Compute one-sample tests of proportions for both one and two tailed tests.

II. PRESENTATION OUTLINE

REQUIRED SOURCES

A. The hypothesis - testing procedure — Chap 8 Sanders

1. null and alternative hypotheses
2. levels of significance
3. decision rules and statistical decisions

B. One sample hypothesis tests of means — Chap 8 Sanders

1. one tailed test with known standard deviation
2. two tailed test with known standard deviation
3. one tailed test with unknown standard deviation
   a. z and t, distribution
4. two tailed test with unknown standard deviation
   a. z and t, distribution

C. One sample hypothesis tests of proportions — Chap 8 Sanders

1. one and two tailed tests for large samples

Lecture Presentation

III. STUDENT EVALUATION

Text and teacher prepared problems for daily assignments.

Teacher prepared quizzes and unit test.

IV. ADDITIONAL RESOURCE MATERIALS

Chap 8 - Statistics - A Fresh Approach, Sanders, Eng, Murph, McGraw-Hill

Chap 9 & 10 - Introduction to Probability and Statistics, Mendenhall 7th Edition, Duxbury

Use additional pages if more space is needed.

CAMPUS: Rice Lake DATE PREPARED: _____

PROGRAM: _____ DATE REVISED: _____

INSTRUCTOR: Gene Lorenz DATE REVISED: _____

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT PLAN OF INSTRUCTION

COURSE TITLE: Statistical Analysis COURSE NUMBER: 10-804-1XA

LESSON/UNIT NO.: 5 TITLE: Testing Hypothesis - Two-sample Procedures

TIME (APPROXIMATE) LECTURE: 6 hrs.

LABORATORY: _____

I. OBJECTIVES/COMPETENCIES

Upon successful completion of this lesson/unit, the student should be able to:

1. Perform the computations for a two-sample test of hypothesis (both one and two tailed) when the population standard deviations are known.
2. Perform the computations for a two-sample test of hypothesis (both one and two tailed) when the population standard deviations are unknown.

II. PRESENTATION OUTLINE

REQUIRED SOURCES

A. Two-sample tests of means — Chap 9 Sanders
   1. the sampling distribution of the difference between sample means
   2. two-tailed testing when the population standard deviations are known
   3. one-tailed testing when the population standard deviations are known
   4. two-tailed testing when the population standard deviations are unknown
   5. one-tailed testing when the population standard deviations are unknown

B. Two-sample tests of proportions — Chap 9 Sanders
   1. the sampling distribution of the differences between sample proportions
   2. two-tailed tests between proportions
   3. one-tailed tests between proportions

Lecture Presentation

III. STUDENT EVALUATION

Text and teacher prepared problems for daily assignments.

Teacher prepared quizzes and test.

IV. ADDITIONAL RESOURCE MATERIALS

Chap 9 - Statistics - A Fresh Approach, Sanders, Eng, Murph, McGraw-Hill

Chap 9 & 10 - Introduction to Probability and Statistics, Mendenhall 7th Edition, Duxbury

Use additional pages if more space is needed.

CAMPUS: Rice Lake DATE PREPARED: _____

PROGRAM: _____ DATE REVISED: _____

INSTRUCTOR: Gene Lorenz DATE REVISED: _____

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT PLAN OF INSTRUCTION

COURSE TITLE: Statistical Analysis COURSE NUMBER: 10-804-1XA

LESSON/UNIT NO.: 6 TITLE: Chi-Square Analysis

TIME (APPROXIMATE) LECTURE: 6 hrs.

LABORATORY: _____

I. OBJECTIVES/COMPETENCIES

Upon successful completion of this lesson/unit, the student should be able to:

1. Use chi-square analysis to test the hypothesis that three or more independent samples have all come from populations having the same proportion of a given characteristic.
2. Use chi-square analysis to test the probability that a population under study fits one with a known distribution of values.

II. PRESENTATION OUTLINE

REQUIRED SOURCES

A. Chi-square distributions and testing — Chap 11 Sanders

1. chi-square distributions

2. chi-square testing
   a. K-sample hypothesis test of proportions

3. goodness of fit test

Lecture Presentation

III. STUDENT EVALUATION

Text and teacher prepared problems for daily assignments.

Teacher prepared quizzes and unit test.

IV. ADDITIONAL RESOURCE MATERIALS

Chap 11 - Statistics - A Fresh Approach, Sanders, Eng, Murph, McGraw-Hill

Chap 13 - Introduction to Probability and Statistics, Mendenhall 7th Edition, Duxbury

Use additional pages if more space is needed.

CAMPUS: Rice Lake DATE PREPARED: _____

PROGRAM: _____ DATE REVISED: _____

INSTRUCTOR: Gene Lorenz DATE REVISED: _____

WISCONSIN INDIANHEAD VTAE DISTRICT

LESSON/UNIT PLAN OF INSTRUCTION

COURSE TITLE: Statistical Analysis COURSE NUMBER: 10-804-1XA

LESSON/UNIT NO.: 7 TITLE: Linear Relationships Between Two Variables

TIME (APPROXIMATE) LECTURE: 6 hrs.

LABORATORY: _____

I. OBJECTIVES/COMPETENCIES

Upon successful completion of this lesson/unit, the student should be able to:

1. Calculate the slope and intersection for the linear regression equation that shows the relationship between two variables.
2. Calculate the standard error of estimate and use it to prepare interval estimates for the dependent variable.
3. Calculate the coefficients of determination and correlation for a linear regression relationship.

II. PRESENTATION OUTLINE

REQUIRED SOURCES

A. Regression analysis — Chap 14 Sanders

1. scatter diagrams
   a. independent and dependent variables
2. linear regression equation
   a. slope and intercet
3. use of equation in forecasting

B. The standard error of estimate — Chap 14 Sanders

1. calculation of
2. interval estimate for predictions

C. Correlation analysis — Chap 14 Sanders

1. coefficient of determination
2. coefficient of correlation

Lecture Presentation

III. STUDENT EVALUATION

Text and teacher prepared problems for daily assignments.

Teacher prepared quizzes and unit test.

IV. ADDITIONAL RESOURCE MATERIALS

Chap 14 - Statistics - A Fresh Approach, Sanders, Eng, Murph, McGraw-Hill

Chap 11 - Introduction to Probability and Statistics, Mendenhall 7th Edition, Duxbury

Use additional pages if more space is needed.

WISCONSIN INDIANHEAD VTAE DISTRICT

COURSE DESCRIPTION/OUTLINE

COURSE TITLE: INDUSTRIAL ECONOMICS AND FINANCE

COURSE NUMBER: ____ - ____ - ____

SEMESTER HOURS: _____

CREDITS: _____

CEU'S: _____

CEC's: _____

CLASSROOM PRESENTATIONS (A) _____

LAB/CLINICAL/SHOP EXPERIENCE (B) _____

INDIVIDUALIZED/INDEPENDENT INSTRUCTION(C) _____

SIMULATED/ACTUAL OCCUPATIONAL EXPERIENCE (D) _____

ON-THE-JOB EXPERIENCE (E) _____

COURSE DESCRIPTION: Will provide an understanding of how financial information can be interpreted and applied by technicians in planning and implementing quality improvements. The students will recognize the significance of depreciation and inventory systems. An Introduction to Quality Costs Concepts will be included.

PREREQUISITES:

COURSE COMPETENCIES:

Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. Explain how to use Quality Cost Systems as a bases for Quality Improvement, profit enhancement and cost improvement.
2. Justify capital expenditures.
3. Display knowledge of budgeting and inventory systems.
4. Describe the function of supply and demand.
5. Explain the difference between internal failure, external failure, prevention and appraisal costs.
6. Describe the function of basic financial statements.
7. Assemble financial information for a management presentation.
8. Summarize approaches to the use of financial ratios.

	APPROVED	REVISED	REVISED	REVISED
OUTLINE PREPARED BY: _____				
OUTLINE SUBMITTED BY: _____				
COORDINATOR APPROVAL: _____				
DISTRICT APPROVAL: _____				

(CD/#MC4)

COURSE OUTLINE BY UNITS:	CLASSROOM HOURS (A)	LAB/CLINICAL/ SHOP HOURS (B)
I. Introduction to Finance and Economics	2	
II. Economics Systems a. Nature of Economics b. Characteristics of Economics	8	
III. Basic Financial Systems a. Income statements, balance sheets and other related statements	8	
IV. Basic Financial Ratios a. Approaches to use of financial ratios b. Evaluation of financial ratios	2	
V. Budgeting Process and Standard Costs	8	
VI. Depreciation	2	
VII. Inventory Functions and Policies a. Basic concepts b. Inventory measurement c. Inventory pricing methods	6	
VIII. Cost Accounting Principles a. Determining unit costs b. Illustration of cost flows	4	
IX. Capital Expenditure Analysis a. Rate of return, payback analysis b. Time value of money c. Purchase vs. lease	8	
X. Quality Cost Concepts	2	
XI. Quality Cost Collection and Analysis	2	
XII. Management Presentation	2	
	54	

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

C623180CO/APRFTCOURS/S38QTXT

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline 06/20/91

COURSE TITLE	Quality Concept and Team Building		
COURSE NUMBER	10-623-180	CLASSROOM PRESENTATIONS	(A) 36.00
SEMESTER HOURS	72.00	LAB/CLINICAL/SHOP EXPERIENCE	(B) 36.00
CREDITS	3.00	INDIVIDUAL/INDEPENDENT INSTRUCTION	(C)
CEU'S		SIMULATED/ACTUAL OCCUPATIONAL EXP	(D)
CEC'S		ON-THE-JOB EXPERIENCE	(E)

COURSE DESCRIPTION:

This course is intended to analyze team building: the steps involved, the members, the process, and the effectiveness. Throughout the course the team concept will be tied into quality improvements. The student will learn various quality tools which will be useful to the team. (PREREQUISITE: 623-160 Introduction to Quality Control.)

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. Evaluate the importance of teamwork and employee involvement.
2. Define the roles of team leaders and team members.
3. Determine the value of work force empowerment and its effectiveness.
4. Distinguish between formal groups and informal groups.
5. Describe the functions fulfilled by groups.
6. Recognize the stages of the change process.
7. Contribute to quality improvement within team framework.
8. Demonstrate the use of the seven basic quality concept tools.
9. Demonstrate the use of the seven management and planning tools.

PREPARED BY: Mike Boyle SUBMITTED BY: Kurt Bents
COORD. APPROVAL: Walt Peters DATE: 6/4/91 REVISED:
DISTRICT APPROVAL: Lois L. Eichman DATE: 6/91

COURSE TITLE: Quality Concept and Team Building
COURSE NUMBER: 10-623-180

COURSE OUTLINE BY UNITS:	TYPE OF HOURS -A-	-B-
I. Quality Leadership A. Principles of B. How to get Started?	2.00	2.00
II. Quality, Improvement Basics A. Deming's 14 Points B. Seven Deadly Diseases C. Flowcharts, Pareto Charts, Cause and Effect Diagrams, Brainstorming	6.00	6.00
III. Team Selection	2.00	2.00
IV. How to get Started Right at Initial Meetings A. Guidelines for Meetings B. Objectives of Meetings	4.00	4.00
V. Development of Improvement Plan A. Direction, Mission Statement B. Scientific Approach C. Steps of Process Improvement D. Strategies	6.00	6.00
VI. Understanding Group Dynamics A. Tuckman's Stages of Team Growth B. Porter's Stages if Team Growth C. Characteristics of Successful Teams	4.00	4.00
VII. Team-Building Activities	2.00	2.00
VIII. Team-Building Exercises	4.00	4.00
IX. Seven Management and Planning Tools	6.00	6.00
Totals	36.00	36.00

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

THE TEAM HANDBOOK, Peter R. Scholtes, Joiner Associates, Inc.
MEMORY JOGGER PLUS+, Michael Brassad, Goal/QPC, 1989.

C623176CO/APRFTCOURS/S38QTXT

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline 06/28/91

COURSE TITLE	Design of Experiment			
COURSE NUMBER	10-623-176	CLASSROOM PRESENTATIONS	(A)	18.00
SEMESTER HOURS	54.00	LAB/CLINICAL/SHOP EXPERIENCE	(B)	36.00
CREDITS	2.00	INDIVIDUAL/INDEPENDENT INSTRUCTION	(C)	
CEU'S		SIMULATED/ACTUAL OCCUPATIONAL EXP	(D)	
CEC'S		ON-THE-JOB EXPERIENCE	(E)	

COURSE DESCRIPTION:

This course is intended to be an introduction to the philosophy of experimental design. The participant will be able to be a vital part of designing an experiment, gathering data, inputing data, and analyzing data. (PREREQUISITES: 804-119 Basic Statistics and 623-170 Statistical Process Control.)

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. Apply analysis of experiment to increased process understanding.
2. Assist in experimental designs.
3. Distinguish between Classical, Taguchi, and Shanin experiments.
4. Use screening designs.
5. Determine crucial process variables.
6. Reduce variation on process variables.
7. Explain the role that design of experiment plays during a product's life cycle.
8. Determine where tolerances could be increased on unimportant variables.

PREPARED BY: Mike Boyle SUBMITTED BY: Kurt Bents
COORD. APPROVAL: Walt Peters DATE: 6/4/91 REVISED:
DISTRICT APPROVAL: Lois L. Eichman DATE: 6/91

COURSE TITLE: Design of Experiment
COURSE NUMBER: 10-623-176

COURSE OUTLINE BY UNITS:		TYPE OF HOURS A	B
I.	Introduction to Industrial Experimentation A. Objectives of Experimentation B. Desirable Properties of a Good Experiment C. Applications for Experiments	1.00	2.00
II.	Concept of Variation	1.00	2.00
III.	Analysis of Means	1.00	2.00
IV.	Analysis of Variance A. F-Ratio B. Contrasts	2.00	4.00
V.	Full Factorial Designs	2.00	4.00
VI.	Fractional Factorial Designs	2.00	4.00
VII.	Screening Designs	1.00	2.00
VIII.	Taguchi Approach	2.00	4.00
IX.	Shanin Approach	2.00	4.00
X.	Evolutionary Operation	2.00	4.00
XI.	Response Surface Methodology	2.00	4.00
	Totals	18.00	36.00

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

UNDERSTANDING INDUSTRIAL EXPERIMENTATION, 2nd Ed., Donald Wheeler, SPC Press, Inc.

C623175CO/APRFTCOURS/S38QTXT

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline 06/20/91

COURSE TITLE	Geometrical Dimensioning and Tolerancing		
COURSE NUMBER	10-623-175	CLASSROOM PRESENTATIONS	(A) 18.00
SEMESTER HOURS	54.00	LAB/CLINICAL/SHOP EXPERIENCE	(B) 36.00
CREDITS	2.00	INDIVIDUAL/INDEPENDENT INSTRUCTION	(C)
CEU'S		SIMULATED/ACTUAL OCCUPATIONAL EXP	(D)
CEC'S		ON-THE-JOB EXPERIENCE	(E)

COURSE DESCRIPTION:

This course is intended to provide an understanding of geometrical dimensioning and tolerancing. It will incorporate uniformity in design practice, fewer misinterpretations, and ensure interchangeability and maximum tolerance allocation. Accommodations will be made for gaging techniques. (PREREQUISITE: 699-110 Print Reading.)

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. Interpret the intent of customer drawings.

2. Develop detailed inspection fixtures utilizing datum references.

3. Design and detail gage drawings for attribute and variable gages using electrical and/or mechanical means.

4. Use geometrical dimensioning and tolerancing symbols and abbreviations for industrial procedures in industry.

5. List advantages of geometrical dimensioning and tolerancing over conventional print reading.

6. Determine capability to measure specific part details.

PREPARED BY: Mike Boyle SUBMITTED BY: Kurt Bents
COORD. APPROVAL: Walt Peters DATE: 6/4/91 REVISED:
DISTRICT APPROVAL: Lois L. Eichman DATE: 6/91

COURSE OUTLINE BY UNITS:	TYPE OF HOURS -A-	HOURS -B-
I. Introduction to GDT A. History B. GDT Advantage	1.00	2.00
II. Abbreviations and Symbols A. Introduction of B. Applications	2.00	4.00
III. Datums A. Defined B. Three Plan Concept	2.00	4.00
IV. Feature Control Symbol A. Defined B. Utilization of	2.00	4.00
V. Specific Rules Used for GDT A. Five Rules That are Crucial to Interpreting Drawings	2.00	4.00
VI. Form and Orientation Controls A. Interrelationship Between Tolerances of and Location vs. Form and Orientation Controls B. Definitions of Applications of Form and Orientation Controls	4.00	8.00
VII. Virtual Condition A. Defined B. Application of	1.00	2.00
VIII. Tolerances of Location A. Principles of Tolerance of Location B. Position Theory C. Concentricity, Cylindrical Features, Multiple Patterns D. Locational Tolerancing E. Projected Tolerance Zone	4.00	8.00
Totals	18.00	36.00

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

INTERPRETATION OF GEOMETRICAL DIMENSIONING AND TOLERANCING, Daniel Puncochar, Industrial Press, Inc.

C699112CO/APRFTCOURS/S38QTXT

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline 07/23/91

COURSE TITLE	Technical Computing and Presentations		
COURSE NUMBER	10-699-112	CLASSROOM PRESENTATIONS	(A) 18.00
SEMESTER HOURS	72.00	LAB/CLINICAL/SHOP EXPERIENCE	(B) 36.00
CREDITS	2.00	INDIVIDUAL/INDEPENDENT INSTRUCTION	(C) 18.00
CEU'S		SIMULATED/ACTUAL OCCUPATIONAL EXP	(D)
CEC'S		ON-THE-JOB EXPERIENCE	(E)

COURSE DESCRIPTION:

This course will build on the skills learned in Industrial/Technical Computer Applications. Within this course we will analyze occupationally-related specific software. Participants will be able to collect, store, analyze, and report information on quality to assist decision making on all levels. (PREREQUISITE: 699-100 Industrial/ Technical Computer Applications.)

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. Describe various applications of quality related software packages.
2. Create spreadsheets for data acquisition and reporting.
3. Design and print graphs.
4. Analyze data in a timely fashion.
5. Build a database system.
6. Develop quality related forms for industry.
7. List potential applications for automated inspection systems.
8. Use other available quality specific software.

PREPARED BY: Mike Boyle SUBMITTED BY: Kurt Bents
COORD. APPROVAL: Walt Peters DATE: 6/4/91 REVISED:
DISTRICT APPROVAL: Lois L. Eichman DATE: 6/91

COURSE OUTLINE BY UNITS:		A	TYPE OF HOURS B	C
I.	Introduction to Technical Aspects	1.0		
II.	Quality-Related Software Packages	2.0		
III.	Measurement and Computers Automated Inspection	2.0		
IV.	Word Processing Applications	3.0	8.00	
V.	Using Spreadsheets in Quality Assurance	3.0	8.00	
VI.	Applications of Database in Quality Assurance	3.0	8.00	
VII.	Graphics Applications in Quality	3.0	8.00	
VIII.	Computer Applications for Quality Improvement	1.0	4.00	18.00
	Totals	18.0	36.00	18.00

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

C801197CO/APRFTCOURS/S38QTXT

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline 08/19/91

COURSE TITLE	Technical Reporting		
COURSE NUMBER	10-801-197	CLASSROOM PRESENTATIONS (A)	54.00
SEMESTER HOURS	54.00	LAB/CLINICAL/SHOP EXPERIENCE (B)	
CREDITS	3.00	INDIVIDUAL/INDEPENDENT INSTRUCTION (C)	
CEU'S		SIMULATED/ACTUAL OCCUPATIONAL EXP (D)	
CEC'S		ON-THE-JOB EXPERIENCE (E)	

COURSE DESCRIPTION:

This course teaches the preparation and presentation of oral and written technical reports. Types of reports may include lab and field reports, proposals, technical letters and memos, technical research reports, and case studies. Designed as an advanced communication course for students who have completed at least the prerequisite introductory writing course. (PREREQUISITE: Completion of 801-195 Written Communication, or special permission of instructor.)

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. Communicate technical information to a variety of audiences in a clear, concise manner.

2. Transfer technical information in a variety of formats (short reports, problem solving reports, proposals).

3. Become computer literate and computer competent in the handling of technical information.

4. Prepare technical documents using the writing process: prewrite, draft, revise, edit.

5. Deliver various types of oral technical presentations for specific audiences.

6. Use audio/visual graphic materials effectively in written and oral reports.

The following minimum expectations, examples, components, and qualities apply to all competencies.

MINIMUM EXPECTATIONS

Assignments are to be selected from at least four of the suggested written products, one major formal research paper, and one oral presentation. Products marked with an * are required of all students.

PREPARED BY: Communications Faculty SUBMITTED BY: George Pratt
COORD. APPROVAL: George Pratt DATE: 01/91 REVISED:
DISTRICT APPROVAL: Lois L. Eichman DATE: 03/91

EXAMPLES

*Formal technical research report
*Oral reports
Technical letters
Technical memos
Progress report
Process report: Expository; Instructional
Inspection
Evaluation
Investigation
Proposal
Feasibility
Field trip report
Lab reports
Case study
Occurrence report
Description

COMPONENTS

Audience analysis
Organization
Purpose
Research
Format/design/presentation
Subject matter/content
Computer-generated documents
Graphics
Collaborative reporting/writing/editing
Ethics

QUALITIES

Unity
Coherence
Continuity
Consistency
Conciseness
Correctness (grammar, spelling, punctuation, capitalization, syntax, professional appearance, legibility, appropriate technical style)
Completeness
Appropriate technical vocabulary
Clarity

COURSE OUTLINE BY UNITS:	TYPE OF HOURS A	B
I. Orientation A. Summary of Course B. Review	3.00	
II. Investigation A. Sources B. Outlining/Planning C. Gathering Information D. Organizing E. Researching	9.00	
III. Prewriting A. Problem B. Purpose C. Audience D. Plan E. Style	15.00	
IV. Drafting A. Design B. Format Types (See examples on page one. Minimum of four plus research paper.)	15.00	
V. Revising/Editing	3.00	
VI. Oral Presentation	9.00	
Totals	54.00	0

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

Lordean, Sally L. and Celia H. Miller, WRITING TECHNICAL REPORTS, Macmillan/McGraw-Hill, ISBN 0-07-024608-4

5/91

C196101CO/APRFTCOURS/S38QTXT

WISCONSIN INDIANHEAD VTAE DISTRICT
Course Description/Outline 08/19/91

COURSE TITLE	Principles of Supervision		
COURSE NUMBER	10-196-101	CLASSROOM PRESENTATIONS	(A) 54.00
SEMESTER HOURS	54.00	LAB/CLINICAL/SHOP EXPERIENCE	(B)
CREDITS	3.00	INDIVIDUAL/INDEPENDENT INSTRUCTION	(C)
CEU'S		SIMULATED/ACTUAL OCCUPATIONAL EXP	(D)
CEC'S		ON-THE-JOB EXPERIENCE	(E)

COURSE DESCRIPTION:

This course presents an overview of the supervisory field. The course introduces aspects of the supervisor's job that are developed in depth in other courses in the Supervisors' Management program. The emphasis is on the improvement of human skills such as communications, motivation, building morale, and leadership development. Management fundamentals such as planning, organization, staffing, directing, delegating, and controlling are taught. Students are exposed to techniques of supervision and labor/management/Affirmative Action relations.

COURSE COMPETENCIES:
Upon successful completion of this course, the student in accordance with the grading standards will be able to:

1. Describe his/her role as the supervisor in relationship to (a) subordinates and (b) superiors.
2. Understand the principles of motivation, communication, organization, leadership and controlling.
3. Coordinate with the activities of the Personnel Department, understand the importance of performance evaluations, and have knowledge of the most common methods of performance evaluation.
4. Understand employee unions, grievance procedures, and the avoidance of grievances by exercising good human relations.
5. Understand the fundamentals of planning, goal setting and management by objectives.
6. Utilize the basic concepts of problem solving, decision making and delegating.
7. Understand the problems of supervision resulting from minority workers, chemically dependent workers and other stress related problems in the work place.
8. Understand the importance of Affirmative Action, and other legal ramifications as associated with the work place and supervision techniques.
9. Understand the importance of the supervisor's role in safety in the work place.
10. Develop basic concepts of time analysis and plan for improved time utilization.

PREPARED BY: SUBMITTED BY:
COORD. APPROVAL: DATE:
DISTRICT APPROVAL: DATE:

COURSE OUTLINE BY UNITS:		TYPE OF HOURS A	B
I.	Introduction/Orientation	3.0	
II.	The Supervisor's Job Organizing and Delegating	4.0	
III.	Planning and Controlling Making Sound Decisions	3.0	
IV.	Communication	4.0	
V.	Handling Conflicts Unit Test: Chapters 1 - 6	4.0	
VI.	Obtaining and Developing an Employee Motivation	4.0	
VII.	Appraisal Supervising Special Problems	3.0	
VIII.	Personnel Procedures Discipline and Grievance Procedures	3.0	
IX.	Formal/Informal Groups Leading the Group	4.0	
X.	Unit Test: Chapters 7 - 13	3.0	
XI.	Supervising Protected Group Members Affirmative Action/Sexual Harassment	3.0	
XII.	Understanding Unions	3.0	
XIII.	Coping with Change Stress and Chemical Dependency	4.0	
XIV.	Safety and Accident Prevention Ethics and Organizational Politics Improving Work Methods	3.0	
XV.	Class Participation and Discussion of Chapters 19, 21, 22	3.0	
XVI.	Unit Test: Chapters 14 - 22 and Lectures	3.0	
	Totals	54.0	0

RECOMMENDED/SUGGESTED TEXTS & MATERIALS:

Ashland - New Richmond - Superior

SUPERVISION: KEY LINK TO PRODUCTIVITY, Rue and Byars, published by Irwin. SUPERVISION: KEY LINK TO PRODUCTIVITY, Student Guide.

Assorted reading and articles selected by instructor.

Rice Lake

SUPERVISORS' MANAGEMENT - THE ART OF WORKING WITH PEOPLE, Mosley, Megginson, Pietri, 2nd Ed., South-Western Publishing Company.